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UNITED STATES NATIONAL MUSEUM

BULLETIN

OF THE

UNITED STATES NATIONAL MUSEU

No. 54

WASHINGTON
GOVERNMENT PRINTING OFFICE
1905

SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

BULLETIN

OF THE

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No. 54

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1905

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This work (Bulletin No. 54) is one of a series of papers intended to illustrate the collections belonging to or placed under the charge of the Smithsonian Institution and deposited in the United States National Museum.

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Papers intended for publication by the National Museum are usually referred to an advisory committee, composed as follows: Frederick W. True (chairman), William H. Holmes, George P. Merrill, James E. Benedict, Otis T. Mason, Leonhard Stejneger, Lester F. Ward, and Marcus Benjamin (editor).

S. P. LANGLEY,

Secretary of the Smithsonian Institution.

WASHINGTON, U. S. A., *December 1, 1905.*

82931

A MONOGRAPH

ON THE

ISOPODS OF NORTH AMERICA

BY

HARRIET RICHARDSON
COLLABORATOR, DIVISION OF MARINE INVERTEBRATES

FOR THE INCREASE AND DIFFUSION OF KNOWLEDGE AMONG MEN
PER ORBEM
SMITHSONIAN INSTITUTION
WASHINGTON 1846

WASHINGTON
GOVERNMENT PRINTING OFFICE
1905

PREFACE.

After several years spent in the preparation of the present monograph, I now offer it to the scientific world, hoping it will meet with favorable consideration. Most of the work has been done in the United States National Museum, where an opportunity was afforded for carrying on the investigation through access to the rich collections and use of the library. The summer of 1904 was spent at Woods Hole, Massachusetts, and occupying a table in the Marine Biological Laboratory through the courtesy of the Carnegie Institution, I continued the studies which I had already begun in Washington.

It will be noticed that but few changes have been made in the classification. In a group where there are so many good workers, I have been glad to follow and adapt to my use what has been already done so well, and keys and synopses of genera have been freely introduced with references to those authors from which they have been taken.

Although I am indebted to many friends for their kind assistance, my obligations to Dr. Theodore Gill are especially great, for it was at his suggestion that the work was undertaken, and under his judicious guidance and supervision it has grown to its present form.

As is well known the natural habitat of the Isopods is in salt and fresh water, along the shore or in the interior of the country, usually in moist situations. They do, however, often occur in places most remote and unlooked for. Some have been found in warm springs and in subterranean streams, in caves and grottoes, pumps and wells, and far from human habitation. The littoral forms are seen around wharf piles, under rocks and stones, on ledges and cliffs, where they are not easily captured, for they seek refuge, with surprising activity, among the cracks and crevices.

The curious habitations sought for shelter and protection are the tubes of worms, the burrows of the crayfish, the nests of mollusks, and the nests of ants. Some live in siliceous sponges, others in corallines or among ascidians.

The parasitic Isopods attack other crustacea as well as fishes. The parasites of fish are found on the skin, fins, gills, and in the mouths of their hosts, and have even been known to bore holes in the body back of the fins. One of these, *Olencira prægustator*, attacks the menhaden

(*Brevoortia tyrannus*), in great numbers. In naming both species, the host and the parasite, Latrobe aptly and fancifully considered the case analagous to that of the ancient chief of state (*tyrannus*) and the taster (*prægustator*). The parasites of crustacea infest the shrimps and crabs or decapodous crustacea and the schizopods. When the parasite occupies the branchial cavity of the host, a large protuberance or swelling is apparent on whichever side the body is infested. The parasites are sometimes found in the visceral cavity or even in the incubatory pouch of their hosts.

The destructive habits of some of the marine and fresh-water species to submerged timber, such as wharfs and bridges, have been heretofore recorded,[a] but not until recently has attention been called to the fact that even the terrestrial forms may give cause for alarm in the nature of pests. Several common and well-distributed species have been found menacing young cotton plants, sugar beets, mushrooms, and cucumber vines.

The burrowing habits of some Isopods are interesting. Chilton says of *Scyphax ornatus* and *Actæcia euchroa* that they "are found on sandy beaches, either on the surface or burying themselves a little in the sand about high water mark or a little lower." Hay, in recently observing the habits of *Scyphacella arenicola*, finds that it also burrows in the sand. The Serolidæ, according to Studer, "live by preference on sandy ground, into which they burrow with their flat bodies up to the caudal plate."

Whitelegge speaks of the paguroid habits of certain Isopods, which "live in small univalve shells and in company with young hermit crabs." Mimicry of external appearance and similarity of habitat is probably very useful in the struggle for existence.

Many of the species found in North America also occur in other parts of the world. The terrestrial Isopods have a wide distribution as well as the parasites of fishes. The Arcturidæ form a rather restricted group. Benedict says of them, in explanation of this fact, that it is due to structure and habits. "The young are few in a brood and are cared for by the parent until well able to care for themselves, clinging to the mother's antennæ until ready to undertake a more independent existence, perhaps on the very object on which the mother is foraging for herself and brood. With habits of this kind the chances of a wide distribution for any one species must be very much less than is the case where free-swimming young are produced in large numbers."

I have not attempted to give here a general account of the morphology, as the reader is supposed to be familiar with the sources where such an account can be found. In another place[a] a brief review of the Isopod structure has already been given.

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[a] See Charles H. Snow, Marine Wood-Borers, Trans. Amer. Soc. Civil Engineers, XL, 1898, pp. 196–199, for notes in this connection.

It has not been considered worth while to encumber the legends with detailed explanation of many of the figures that have been taken from other authorities; students, however, who desire to learn the significance of the lettering not given in the illustrations, are referred to the original papers.

As a final suggestion I would like to say that my object in undertaking this work has been to assist the student in the determination of the forms by giving figures and descriptions of all the species. It is to be hoped, in case of omissions or errors, that leniency will be observed, for the task has not always been easy.

Harriet Richardson.

Washington City, *November 1, 1905.*

POSTSCRIPT.

Since this monograph has been printed, and within the last few days, Dr. H. J. Hansen's paper on the Propagation, Structure, and Classification of the Sphæromidæ has been received.[b] With a large amount of material, a comparison of types from various museums all over the world, and a thorough examination of specimens, Doctor Hansen has arrived at an excellent classification of this group, which has heretofore been in an extreme state of confusion and so recognized by all who have attempted to determine species or to refer them to their proper genera. In Doctor Hansen's paper new genera have been established and some old ones canceled. The changes which particularly affect the present paper and which I have not been able to make use of in the text, inasmuch as Doctor Hansen's paper was received too late, are as follows: The genus *Cassidisca*, new genus, must be canceled as being a synonym of Hansen's new genus *Cassidinidea; Cilicæa caudata*, *C. gilliana*, *C. sculpta*, and *C. cordata* must be referred to Hansen's new genus *Paracerceis*. The following list shows these relations more exactly: *Cassidisca ovalis = Cassidinidea ovalis; Cassidisca lunifrons = Cassidinidea lunifrons; Cilicæa caudata = Paracerceis caudata; Cilicæa gilliana = Paracerceis gilliana; Cilicæa cordata = Paracerceis cordata; Cilicæa sculpta = Paracerceis sculpta.*

While in New Haven last summer I examined the second pleopods of a number of cotypes of *Dynamene perforata* and found that the males and females of this species were similar, with the exception that the endopod of the second pleopod in the male carried a stylet. The females had the transverse foramen, which constituted the proximal part of the abdominal notch, just as did the males. With this modification of Hansen's genus *Dynamenella*, of which he makes *Dynamene perforata* the type, I can then refer to it the following species: *Dynamene benedicti*, *Dynamene glabra*, and *Dynamene moorei*. The following shows these relations more exactly: *Dynamene perforata* = *Dynamenella perforata; Dynamene benedicti* = *Dynamenella benedicti; Dynamene glabra* = *Dynamenella glabra; Dynamene moorei* = *Dynamenella moorei*. Inasmuch as only females are known of *Dynamene angulata* and *Dynamene dilatata*, it can not be stated positively whether they should be referred to *Dynamenella* or *Paracerceis*. Doctor Hansen says that, judging from the aberrant shape of the antennulæ, *D. dilatata* must probably be established as the type of a new genus.

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[a] Contributions to the Natural History of the Isopods, by Harriet Richardson, Proc. U. S. Nat. Mus. XXVII, 1904, pp. 4-17.

[b] Quarterly Journal of Microscopical Science, XLIX, Pt. 1. 1905, new ser., pp. 69-135. (October number received here November 11.)

In regard to *Cilicæa linguicauda* and *Cilicæa granulosa*, Doctor Hansen says that the former is probably, the latter perhaps, a species of *Cymodoce*. Upon an examination of the pleopods subsequent to the printing of my paper and the publication of Doctor Hansen's I find that these two species not only should not be referred to the genus *Cymodoce*, but not even to the section Cymodocini or to the group Sphæromінæ hemibranchiatæ. Both branches of the fourth pair of pleopods are similar, fleshy, with transverse folds, without plumose setæ, and the outer branch is not two-jointed. These two species, therefore, belong to the group Sphærominæ eubranchiatæ. In these species the exopod of the third pleopod has an articulation, and is therefore two-jointed. The character of the abdominal notch without paired denticles would seem to exclude them from the genus *Paracerceis* as restricted by Hansen. The character of the uropods, which are strongly altered, would exclude them from the genus *Cerceis* Milne Edwards. They can not be placed with *Haswellia* Miers, because they lack the large, mesial process on the sixth thoracic segment. It will be necessary to establish a new genus for these two species, for which I propose the name *Discerceis*, *C. granulosa* being the type.

Doctor Hansen does not mention *Cilicæa carinata* in his discussion of the species of this family. Upon examination, I find that the branches of the fourth pleopoda are similar, fleshy, crossed with transverse folds, the outer branch being unjointed. The outer branch of the third pleopod is also unjointed. Although the only specimen is a male, judging from the character of the uropods and their similarity to the males of other genera in this family, there is no stylet attached to the inner branch of the second pleopod, in this respect being comparable to *Dynamene* (*Næsa*) Leach and *Ancinella* Hansen. I therefore make this species the type of a new genus *Dynameniscus*.

Doctor Hansen says that *Sphæroma yucatanum* has been established on females or young males of animals belonging to the genus *Cymodoce*. The only specimen is a young female.

Toward the end of his paper Doctor Hansen makes the statement that the species *Tecticeps convexus* was established on the female form of *Tecticeps alascensis*, and therefore cancels the first-named species. As Doctor Hansen had seen only the two sexes of *Tecticeps alascensis* and had not seen any specimens of *Tecticeps convexus*, this error was a natural one. Inasmuch as both sexes of both species are in the collection of the U. S. National Museum, it would be well to point out the sexual differences as perhaps I have not done sufficiently heretofore or even in the pages to follow. The females of both *Tecticeps alascensis* and *Tecticeps convexus* differ from the males in having the second pair of legs ambulatory and similar in structure to those following, while in the males the second pair of legs are subchelate. The female of *Tecticeps alascensis* has the exopod of the uropod not longer than the endopod, and thus differs from the male, which has the exopod longer than the endopod. In the species *T. convexus*, however, the exopod of the uropod is equal in length to the endopod in both sexes. The females of the two species are quite similar, both having the exopod of the uropod short, but they can easily be distinguished by the difference in the position of the eyes, the difference in the shape of the extremity of the terminal abdominal segment, and the difference in the length of the antennæ. Male specimens are compared in the pages to follow, and the differences given in the key are from a comparison of males. It is to be hoped that with these additional notes no difficulty will be found in distinguishing the two species, and that the validity of *Tecticeps convexus*, heretofore established, is correctly maintained.

H. R.

WASHINGTON CITY, *December 1, 1905.*

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A MONOGRAPH ON THE ISOPODS OF NORTH AMERICA.

By Harriet Richardson,
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INTRODUCTION.

In the preparation of the present monograph my purpose has been to give descriptions and figures of all the species of isopodous crustacea, marine, terrestrial, and fresh-water, known to North America, with synopses, so as to assist the student in the identification of each species. The descriptions are made as concise and as nearly uniform as possible. The original descriptions have been prepared primarily from specimens in the collection of the U. S. National Museum, but have been supplemented by specimens from other museums. The collection from the Museum of Comparative Zoology at Harvard University, for the examination of which I am indebted to Prof. Walter Faxon; the collection in the Peabody Museum of Yale University, which I obtained through the courtesy of Prof. A. E. Verrill; the collection from the American Museum of Natural History, kindly loaned me by Prof. W. M. Wheeler; the collection from the University of Pennsylvania, which I obtained through the kindness of Dr. Philip P. Calvert and Dr. J. Percy Moore; the collection from the Academy of Natural Sciences of Philadelphia, including Say's valuable types, loaned to me by Doctor Pilsbry; the collection from the University of California, kindly sent by Dr. William E. Ritter, and specimens from the University of Cincinnati, obtained through the kindness of Prof. Joshua Lindahl, have been of great assistance in the preparation of this work. In addition to these valuable sources, specimens have also been sent me by Dr. Carl Eigenmann, of the University of Indiana, by the U. S. Bureau of Fisheries, the U. S. Department of Agriculture, and various others.

A large number of the North American species described are not represented in the museums of this country. The descriptions of these forms are quoted from various sources, the original description being given in some cases—in other cases a later description by another author, where the description seemed better. Where the descriptions are quoted, I have not seen or examined any specimens.

Synopses are given for the superfamilies, families, genera, and species. In some cases the synopses do not differ from those which I have previously published for this group. A number of them, however, have been modified. As stated heretofore in previous papers, the synopses of other authors have been used partly or entirely when possible. All the available sources have been investigated and the work of others introduced with few and only necessary changes, in order to adapt it to the material at hand. Schiœdte and Meinert's keys for the Cymothoidæ and the Ægidæ, Hansen's keys for the Cirolanidæ and Exocorallanidæ, Budde-Lund's keys for the Oniscidæ and Armadillididæ, Stebbing's keys for the Anthuridæ and the Tanaidæ, Benedict's keys for the genus *Synidotea* and the genus *Arcturus* have been adapted or followed to a great extent. New species introduced into the keys have also caused many modifications. The works of G. O. Sars have been of great service in obtaining definitions of families and genera for use in the synopses and for diagnoses.

The geographical range included in the present paper is the Atlantic coast of North America to Panama, including Greenland, the West Indies, the Bahamas, and the Bermudas; the Pacific coast of North America to Panama, including Alaska; the fresh-water bodies in North America, and all the territory north of the Isthmus of Panama.

Most of the illustrations are original, but in many cases the figures of various authors have been reproduced, and due acknowledgments have been recorded in the text in every case. I take pleasure, however, in a collective expression of my thanks and obligations to each and all of the authors whose valuable monographs and memoirs have been utilized in this connection.

THE ISOPODA.

The body is dorso-ventrally flattened, and is divided into three parts—a head, a thorax composed of seven segments, and an abdomen of six segments. One or two of the segments of the thorax may be united with the head. The head appendages are two pairs of antennæ, a pair of maxillipeds, two pairs of maxillæ, and a pair of mandibles. The maxillipeds are often provided with an epignath on the outside. In the parasitic forms the mouth parts are strongly modified, some of the parts having entirely disappeared. The eyes which are usually present are paired, sessile and compound, sometimes contiguous, sometimes distant. The appendages of the thorax are seven pairs of legs; the last pair are sometimes wanting. The legs are of uniform structure and appearance in the terrestrial forms, but in a large number of forms the first pair, and even the second, third, and fourth pairs differ conspicuously in structure, length, and function from the succeeding pairs. There are six pairs of abdominal appendages, usually five pairs of pleopods and a pair of uropods. The pleopoda are in some cases natatory, but their function is respiratory for the most part. Some or all of the segments of the abdomen may be united. The telson is very rarely free.

Marsupial plates are developed in the female, forming an incubatory pouch.

ANALYTICAL KEY TO THE TRIBES OR SUPERFAMILIES OF NORTH AMERICAN ISOPODA.[a]

a. Legs of first pair cheliform. Uropoda terminal. Pleopoda, when distinctly developed, exclusively natatory..........I. TANAIOIDEA or CHELIFERA
a′. Legs of first pair not cheliform.
  b. Uropoda lateral.
    c. Uropoda forming together with the terminal segment of the abdomen a caudal fan. Pleopoda for the most part natatory.
      II. CYMOTHOIDEA or FLABELLIFERA 54
    c′. Uropoda valve-like, inflexed, arching over the pleopoda, which to a great extent are branchial..............III. IDOTHEOIDEA or VALVIFERA 173
  b′. Uropoda terminal.
    c. Pleopoda not fitted for air breathing, exclusively branchial.
      d. Pleopoda generally covered by a thin opercular plate (the modified first pair). Free forms..................IV. ASELLOIDEA or ASELLOTA
      d′. Pleopoda never covered by an opercular plate. Parasitic forms.
        V. BOPYROIDEA or EPICARIDEA
    c′. Pleopoda fitted for air breathing.......................VI. ONISCOIDEA 583

I. TANAIOIDEA or CHELIFERA.[b]

Head fused with the first and sometimes with the second segment of the thorax to form a carapace. Branchial cavity on each side of carapace. Following five or six segments of thorax distinctly defined with epimera small or inconspicuous.

Uropoda terminal, consisting of a short basal segment and one or two filamentary branches. First pair of legs terminate in a cheliform hand. Abdomen generally composed of six segments, usually distinct. First pair of antennæ furnished with one or two flagella. First maxillæ have a backward directed palp, situated in the posterior part of the carapace. Maxillipeds have a four-jointed palp, and a large backward directed branchial epignath, which passes into the branchial cavity. Pleopoda, when present, natatory.

ANALYTICAL KEY TO THE FAMILIES OF TANAIOIDEA OR CHELIFERA.

a. Body scarcely attennuated behind. Mandibles without palp. Superior or first pair of antennæ with one flagellum (never two), which is sometimes absent, usually rudimentary, rarely well developed in female, and multiarticulate in male. Anterior maxillæ with only a single masticatory lobe and a one-jointed palp; posterior ones quite rudimentary. Second pair of legs ambulatory in character. Epignath of maxillipeds narrow, falciform .....Family I. TANAIDÆ

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[a] Sar's analytic key has been used with slight modifications. See his An Account of the Crustacea of Norway, II. Isopoda, 1899, p. 3.

[b] See Sars' Crust. of Norway, II, 1899, pp. 4, 5, and Norman and Stebbing, Trans. Zool. Soc. London, XII, 1886, pp. 78–79, for characters of superfamily.

a'. Body narrow, produced, depressed. Mandibles with a three-jointed palp. Superior or first pair of antennæ with two multiarticulate flagella. Anterior maxillæ with two masticatory lobes and a two-jointed palp; posterior ones well developed and setose. Second pair of legs with a large, broad, flat hand. Epignath of maxillipeds large, laminar, branchial in character.
Family II. APSEUDIDÆ

Family I. TANAIDÆ.[a]

Body scarcely attenuated behind. First pair of antennæ simple, without any secondary filament or flagellum. Single flagellum sometimes absent, and generally rudimentary, rarely well developed in female, and multiarticulate in male. Second antennæ without a scale; flagellum usually rudimentary, rarely well developed. Mandibles without palp. Second maxillæ represented by minute rudimentary lobes. Anterior maxillæ with only a single masticatory lobe. Epignath of maxillipeds narrow, falciform. Second pair of legs not differing from the following peræopods. Gnathopods never furnished with palps or exopods. Pleopods with branches uniarticulate. Uropoda simple or furnished with two short filaments.

ANALYTICAL KEY TO THE GENERA OF TANAIDÆ.

a. Less than five pairs of pleopoda present. Uropoda simple, short, single-branched. Eyes present.
  b. Only two pairs of pleopoda present. Abdomen composed of three segments. Uropoda composed of only two articles..........Genus *Pancolus* Richardson
  b'. Only three pairs of pleopoda present. Abdomen composed of five to six segments. Uropoda composed of three to seven articles.
Genus *Tanais* Audouin and Edwards
a'. Five pairs of pleopoda present. Uropoda double-branched.
  b. Incubatory pouch formed only by two lamellæ issuing from bases of fourth pair of legs..........Genus *Cryptocope* Sars
  b'. Incubatory pouch normal.
    c. Inner branch of uropoda 2-3 jointed. Pleopoda in female very small, or rudimentary..........Genus *Leptognathia* Sars
    c'. Inner branch of uropoda more than 2-3 jointed. Pleopoda well developed.
      d. Gnathopods in male imperfectly chelate, without any finger, or with finger very short and immovable..........Genus *Heterotanais* Sars
      d'. Gnathopods in male with chelæ fully developed.
        e. Gnathopods in male very much elongated, with carpus attenuated, hand very large, oblong, fingers elongate and curved; immovable one strongly tuberculate within. Thoracic appendages not specialized into an anterior and a posterior series..........Genus *Leptochelia* Dana
        e'. Gnathopods in male with chelæ very stout, the distal section of the penultimate joint extremely broad, with a toothed margin. Thoracic appendages specialized into an anterior and a posterior series.
Genus *Neotanais* Beddard

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[a] See Sars' Crust. of Norway, II, 1899, pp. 10, 11, and Norman and Stebbing, Trans. Zool. Soc. London, 1886, XII, pp. 102-103, for characters given below.

1. Genus PANCOLUS Richardson.

Eyes present, distinct. First pair of antennæ composed of three articles. Second pair of antennæ composed of five articles. First thoracic segment permanently united with the head to form a carapace. The following six segments are free and distinctly separated. The abdomen is composed of only three segments, two segments anterior to the terminal segment. There are but two pairs of well-developed pleopoda. The uropoda are single branched and consist of a peduncle and a branch composed of a single article. The first pair of legs are chelate. All the following six pairs are ambulatory.

PANCOLUS CALIFORNIENSIS Richardson.

Pancolus californiensis Richardson, Proc. U. S. Nat. Mus., XXVIII, 1905, pp. 367-369.

Locality.—Monterey Bay, California.

Body narrow, elongate, 5½ mm. long, and almost 1½ mm. wide.

Head as wide as long, 1½ mm. : 1½ mm., with the anterior margin somewhat triangular between the eyes, which are placed in the extreme antero-lateral angles. The head anteriorly is about half as wide as it is posteriorly. The first pair of antennæ have the first article large and robust, about half as wide as long; the second article is half as long as the first; the third is a little shorter than the second and terminates in a bunch of hairs. The second pair of antennæ are shorter than the first, reaching only to the end of the second article of the first pair of antennæ. The first article is longest, being three times longer than the second; the third is about twice as long as the

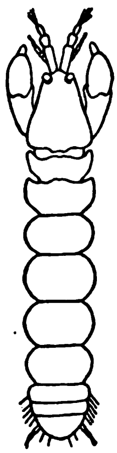

Fig. 1.—Pancolus californiensis. × 9.

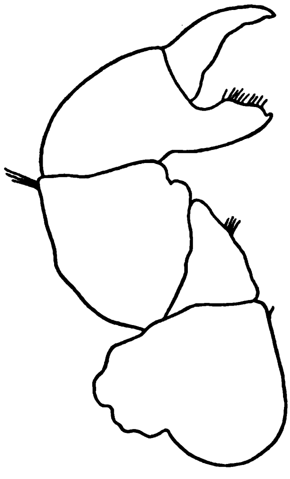

Fig. 2.—Pancolus californiensis. First gnathopod. × 20.

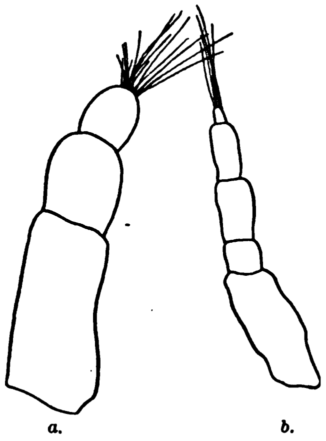

Fig. 3.—Pancolus californiensis. *a*, First antenna. × 44. *b*, Second antenna. × 44.

second; the fourth is more than one and a half times longer than the second; the fifth is minute and terminates in a bunch of hairs.

The first segment of the thorax is coalesced with the head to form a carapace. The second or first free segment is a little shorter than any of those following. The third and fourth or second and third free segments are subequal; the last three are subequal, and each is a little longer than either of the two preceding segments.

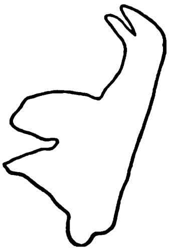
FIG. 4.—PANCOLUS CALIFORNIENSIS. MANDIBLE. × 44.

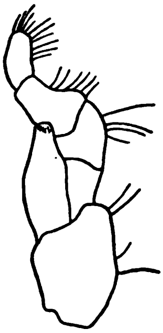
FIG. 5.—PANCOLUS CALIFORNIENSIS. MAXILLIPED. × 44.

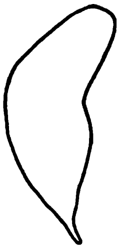
FIG. 6.—PANCOLUS CALIFORNIENSIS. EPIGNATH OF MAXILLIPED. × 44.

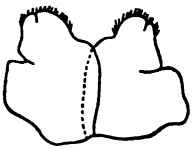
FIG. 7.—PANCOLUS CALIFORNIENSIS. POSTERIOR LIP. × 44.

The abdomen is composed of three segments, two short ones followed by the terminal segment, which is rounded posteriorly. The uropoda are single branched. The peduncle is short. The branch consists of a single article, tipped with long hairs. There are but two pairs of well-developed pleopoda.

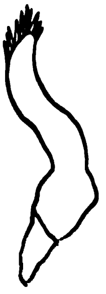
FIG. 8.—PANCOLUS CALIFORNIENSIS. FIRST MAXILLA. × 44.

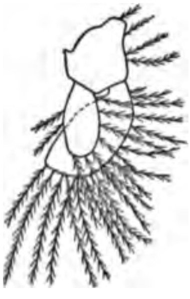
FIG. 9.—PANCOLUS CALIFORNIENSIS. FIRST PLEOPOD. × 44.

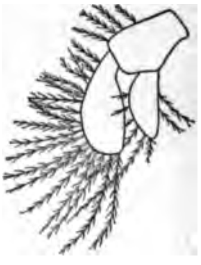
FIG. 10.—PANCOLUS CALIFORNIENSIS. SECOND PLEOPOD. × 44.

The first pair of legs or gnathopods are chelate. The second pair of legs are long and feeble, and similar to those following, which are ambulatory, but more robust. The dactyli in the last three pairs are unci.

Six specimens of this species were collected by Mr. Harold Heath at Monterey Bay, California.

The types are in the U. S. National Museum. Cat. No. 30614, U.S.N.M.

2. Genus TANAIS Audouin and Edwards.

Eyes present and well developed. Abdomen composed of five or six segments. Only three pairs of pleopoda present, all fully developed. Uropoda simple, single-branched. Incubatory pouch formed of two lamellæ issuing from the base of the fifth pair of legs. Mandibles strong with the molar expansion well developed.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS TANAIS.

a. Pereiopoda having the first three joints short and broad, affixed to the sides of the pereion like plates of mail. Inferior antennæ scarcely half the length of the superior antennæ.................................. *Tanais loricatus* Spence Bate

a′. Pereiopoda with joints not dilated, slender. First and second antennæ of nearly equal length.

- *b*. Abdomen composed of five segments.
  - *c*. Uropoda composed of three articles, a basal article, and a bi-articulate branch. First and second abdominal segments with transverse setiferous bands. *Tanais cavolinii* Milne Edwards
  - *c′*. Uropoda composed of seven articles, a basal article, and a branch composed of six articles. First and second segments of abdomen without setiferous bands.................................. *Tanais alascensis* Richardson
- *b′*. Abdomen composed of six segments.
  - *c*. Uropoda composed of four articles, the peduncle, and a branch composed of three articles. Body robust. Last three segments of abdomen not abruptly narrower than three preceding segments. Posterior end of head about two and a half times wider than anterior end. First pair of legs with chelæ strong and powerful, the dactylus strongly arched, finger and thumb widely separated in male.................................. *Tanais robustus* Moore
  - *c′*. Uropoda composed of six articles, the peduncle, and a branch composed of five articles. Body narrow, elongate. Last three segments of abdomen abruptly narrower than three preceding segments, about half as wide. Posterior end of head not greatly wider than anterior end. First pair of legs with finger and thumb not widely separated. *Tanais normani* Richardson

TANAIS LORICATUS Spence Bate.

Tanais loricatus SPENCE BATE, Lord's Naturalist in British Columbia, II, 1866, p. 282.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 819; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 159; American Naturalist, XXXIV, 1900, p. 210.

Locality.—Esquimault Harbor, British Columbia.

Found in the hollow of a sponge.

"Exemplum imperfectum; inferiores antennas semi-breviores quam superiores habens; gnathopodum primi paris propoda ovata dactylo breve et tumido; periopodum primis tribus articulis brevibus et latis sunt, loricis ad pereionem adherentibus.

"The only specimen in the collection is imperfect. The first segment of the pereion appears to be imperfectly fused with the cephalon; inferior antennæ scarcely half the length of the superior. First pair of gnathopoda having the propodus ovate; dactylos short and tu shorter and less pointed than the digital process of the prop

Periopoda having the first three joints short and broad, being affixed to the side of the pereion like plates of mail (hence the specific name); they terminate in short, pointed dactyli, and have the propodi armed with two lateral rows of strong, black, pointed teeth.

"This species was taken from the hollow of a sponge dredged in Esquimault Harbor, at the depth of about ten fathoms."—Spence Bate.[a]

TANAIS CAVOLINII[b] Milne Edwards.

Tanais cavolinii Milne Edwards, in Audouin and Milne Edwards Précis d'Entomologie, I, 1829, pl. xxix, fig. 1; Hist. Nat. des Crust., III, 1840, p. 141, pl. xxxi, fig. 6.

Tanais tomentosus Krøyer, Nat. Tidsskrift, IV, 1842, p. 183.

Crossurus vittatus Rathke, Nova Acta Academiæ Cæsareæ Leopoldino-Carolinæ Naturæ Curiosorum, XX, 1843, p. 39, pl. i, figs. 1-7.

Tanais tomentosus Krøyer, Nat. Tidsskrift (2), II, 1847, p. 412; Voy. en Scand., Crust., 1849, pl. xxvii, figs. 2 a-q.—Lilljeborg, Öfvers. Vet. Akad. Forh., Årg., VIII, 1851, p. 23.

Tanais hirticaudatus Bate, Rep. Brit. Assoc., 1860, p. 224, 1861.

Tanais vittatus Lilljeborg, Upsala Univ. Arsskr., Math. og Naturv., I, 1865, pp. 29-30.—Bate and Westwood, Brit. Sess. Crust., II, 1866, p. 125.—Stebbing, Trans. Devon. Assoc., 1874, p. 7.—McDonald, Trans. Linn. Soc. (2), I (Zoology), p. 67, pl. xv.—Stebbing, Ann. Mag. Nat. Hist. (4), XVII, 1876, p. 78; Trans. Devon. Assoc., 1879, p. 6.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 162; Report U. S. Fish Comm., 1880, Pt. 6, pp. 418-419, pl. xiii, figs. 81-82.

Tanais tomentosus Sars, Archiv. for Math. og Naturvid., 1882, pp. 22-23.—Scott, Ann. Scottish Nat. Hist., 1898, pp. 218-219.—G. O. Sars, Crust. Norway, II, 1899, p. 12, pl. v.

Tanais cavolinii Dollfus, Bull. Soc. Zool. France, XXII, 1897, p. 207; Mém. Soc. Zool. France, XI, 1898, p. 35.—Norman, Ann. Mag. Nat. Hist. (7), III, 1899, pp. 332-333. (See Norman for synonymy.)—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 501; Trans. Conn. Acad. Sciences, XI, 1902, p. 278.

Localities.—Noank, Connecticut; Long Island Sound; Greenland; Castle Harbor, Bermudas, in dead coral; also west coast of Norway; British Isles; Bay of Fayal; West France; Azores; in the Atlantic at Ile Dumet, near Croisac; Guétharry; St. Jean de Luz; Hendaye; in the Mediterranean at Banyuls; Cette; Bandol; Cannes; Ile Rousse; Porto Vecchio; St. Eugène; Lake of Bizerte; Sousse.

Depth.—Occurs on piles and among algæ and eel-grass (Harger.) 1-6 ft. (Verrill).

Found in sponges, algæ; on *Pinna;* on *Balanus;* on *Laminaria;* on oysters.

Body elongate, four times longer than wide, 1 mm.: 4 mm. Head about as wide at the base as it is long, 1 mm.: 1 mm., becoming gradually narrower from the base to the anterior end, where it is about one-half mm. wide; the anterior margin is somewhat triangularly produced, with apex very obtuse. The eyes are small, composite, and situated at the antero-lateral angles of the head. The first pair of antennæ have the basal article very long and about equal to two-thirds the length of the head; the second article is half as long as the first; the third is almost as long as the second; the terminal article is minute. The first pair of antennæ are about 1 mm. in length. The second antennæ have the first article long; the second article is about half as long as the first; the third is a little longer than the first; the fourth is half as long as the third; the fifth article is minute. The second antennæ are more slender and are shorter than the first pair, extending only to the end of the second article of the first pair. The maxillipeds have a palp of four articles. The palp of the mandibles is wanting.

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[a] Lord's Naturalist in British Columbia, II, 1866, p. 282.

[b] See Harger for more complete description of this form.

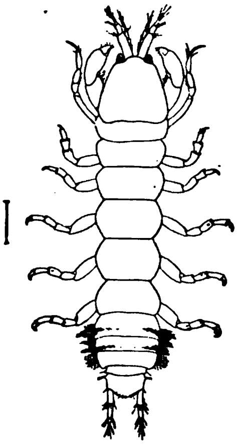

FIG. 11.—TANAIS CAVOLINII (AFTER HARGER). × 8.

The first segment of the thorax is united with the head to form a carapace. The second and third segments are subequal, and each is a little shorter than any of the four following, which are about equal in length.

The abdomen is composed of five segments, four anterior to the terminal segment. The first two have a transverse row of long plumose hairs fringing the posterior margins. The fourth segment is very short, not more than half as long as any of the three preceding segments. The terminal segment has the posterior margin obtusely pointed. The uropoda are composed of three articles, a basal article or peduncle and two others, which form a single branch. The second article of the single ramus is half as long as the first article.

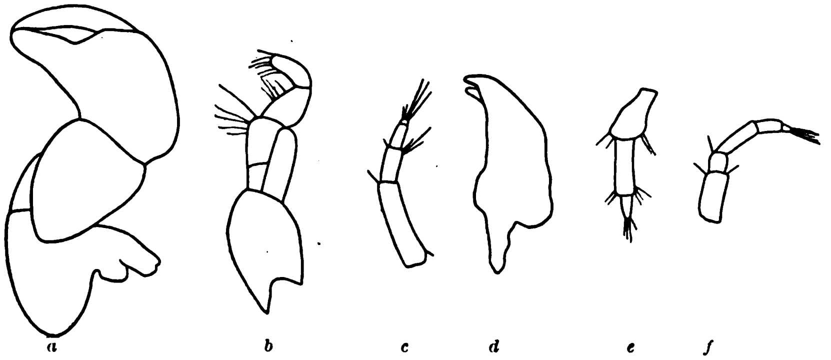

FIG. 12.—TANAIS CAVOLINII. *a*, FIRST LEG. *b*, MAXILLIPED. *c*, FIRST ANTENNA. *d*, MANDIBLE. *e*, UROPOD. *f*, SECOND ANTENNA.

The first pair of legs are chelate; the other six pairs are ambulato

There are three pairs of pleopoda.

TANAIS ALASCENSIS Richardson.

Tanais alascensis Richardson, Proc. U. S. Nat. Mus., XXI, 1899, pp. 819–820; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 159–160; American Naturalist, XXXIV, 1900, p. 211.

Locality.—Kyska Harbor, Alaska.

Depth.—6–12 fathoms, in sand and mud.

Body three and a half times longer than broad.

Head large, narrowed anteriorly. Frontal margin almost straight. First pair of antennæ short, stout, consisting of three joints, the first joint being the longest, and a rudimentary flagellum of two joints. Second pair of antennæ more slender, a little longer, consisting of five articles, the first joint being longest, and a rudimentary flagellum of one joint. Eyes small and pedunculated.

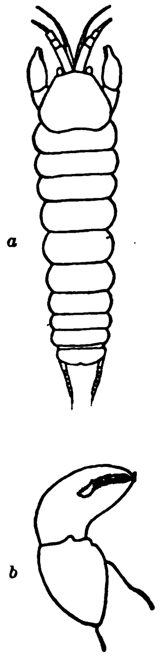

Fig. 14.—Tanais alascensis. *a*, Dorsal view. × 8. *b*, Last joints of leg of the first pair.

The first segment of the thorax is confluent with the head. The second, third, fourth, and fifth segments increase slightly in length; the fifth and sixth are about equal; the seventh is not quite so long as the preceding one.

The abdomen is composed of five segments, the first three of which are subequal; the fourth is short, about half as long as any of the others and also narrower; the terminal segment is as long as the two preceding ones together, and is rounded posteriorly, with a slight median notch. The segments of the abdomen decrease in width gradually from the first to the terminal segment. The terminal filaments are seven-jointed—the peduncle forming the first article—and single-branched, and are furnished at their extremities with a few long hairs. There are three pairs of pleopoda attached to the first three segments.

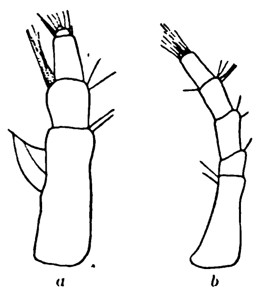

Fig. 13.—Tanais alascensis. *a*, First antenna. × 39. *b*, Second antenna. × 39.

The first pair of legs are stout and chelate; the propodus is produced into a strong immovable finger, irregular in shape, having its central portion raised and truncate on its upper surface, which is distinctly serrate. The dactylus is likewise serrate on its inner surface. The other legs are slender, with a gradual increase in stoutness.

Color brown, marked in some specimens with a darker brown, and having oval patches of the darker color on the head.

Kyska Harbor, Alaska; Dr. W. H. Dall, collector; depth, 6 to 12 fathoms.

Type.—Cat. No. 22563, U.S.N.M.

TANAIS ROBUSTUS Moore.

Tanais robustus MOORE, Proc. Acad. Nat. Sci. Phila., 1894, pp. 90-94, pl. v.—RICHARDSON, American Naturalist, 1900, XXXIV, p. 211; Proc. U. S. Nat. Mus., 1901, p. 501.

Locality.—New Jersey.

Found "inhabiting minute tubes in the crevices between the scales of the turtle's (*Thalassochelys caretta*) carapace. When unmolested these little crustaceans could be seen crawling carefully about among their fellow voyagers or lying at the mouths of their domiciles with only the head and chelæ projecting; when disturbed they promptly retreated out of sight."—MOORE.

"It is quite robust for the family, being less than 3½ times as long as broad. The carapace, which is the broadest portion of the body, is terminated anteriorly by a minute rostrum, whilst its posterior border is somewhat concave in the middle line. In front of the origin of the great gnathopods the lateral outline is strongly concave, but opposite the bases of these limbs it becomes swollen. When viewed dorsally, the carapace appears in general figure top-shaped. Two grooves, one on each side, indicate upon the dorsal surface the inner boundary of the branchial chamber. Behind the carapace the breadth of the body becomes gradually less with each successive segment. The fourth free segment of the peræon is the longest, slightly exceeding the third, which is in turn longer than the fifth.

"The pleon is composed of six distinct segments, of which the fourth and fifth are much shorter than the others and the sixth is terminated posteriorly by a blunt median projection. The body is constricted at the joints and the segmentation is distinctly marked. The dorsal surface is furnished laterally with a few setæ, which on the first and second segments of the pleon form a short row on each side, but never form a transverse band crossing the segment.

"The eyes and eye-lobes are large, the latter being let into deep recesses in the anterior lateral portion of the carapace.

"The antennulæ consist of three joints, of which the basal one is somewhat longer than the other two combined. A small knob (rudimentary flagellum) terminates each. In the male the antennulæ usually about equal in length the carapace with the first free segment, but are sometimes considerably longer. In the female they are about equal to the carapace alone.

"The antennæ lie close beneath the antennulæ, by which they are slightly exceeded in length in both male and female. They are five-jointed, the fourth joint being the longest, slightly exceeding the second; the fifth, third, and first following in the order named, the last mentioned being very short. Each antenna is terminated by a densely setiferous rudimentary flagellum considerably longer than that of the antennules and sometimes imperfectly articulated.

"The mandibles are of the usual form, curved inward at the tip, where each bears a pair of horny teeth, shaped like the limbs of the letter U. Proximad of the middle a stout transverse column passes mediad bearing at its end an oval plate transversed by a series of parallel ridges with deep grooves between. Under a high power each ridge appears to be broken up by shallow indentations into a series of rounded teeth.

"The first maxillæ consist of a stout forwardly directed column and a posteriorly directed palpus, bearing at its end a brush of seven or eight long setæ. The anterior ramus is stout and curved toward the median line, bearing at its tip a group of about eight stout, curved spines, each with two series of fine, apically directed denticuli. A brush of stiff setæ lies near the base, and laterad of, the spines. A smaller group of spines lie on one face near the tip; these are not denticulate and lack the brown color of those in the apical group.

"The maxillipeds are adherent basally by means of short, stout hooks. The basal joints are prolonged on their anterior or oral aspects into plate-like processes, which are coupled together in the median line. Each basal joint bears a flattened palpus, consisting of four joints, the terminal three being furnished with long setæ. The distal joint is strongly flexed on the penultimate. A somewhat falciform branchial epipod is attached to the maxilliped at its base by means of a slender stalk.

"The first gnathopods are strongly chelate in both sexes, but especially so in the males. The 'thumb' of the propodite is terminated by a horny tooth, and external to and just within this is a sharp-edged tubercle; the tooth of the dactylopodite bites between the two. Fig. 15, *f* and *g*, on page 13, show the gnathopods of male and female side by side, and give a better idea of their appearance than can be gained from a description.

"The limbs of the first free segment of the peræon are long and slender, their terminal claws being but slightly curved. The two succeeding pairs are stouter, with the dactylopodite and claw shorter than in the first pair. The last three pairs are still stouter; the dactylopodite bears a strongly hooked claw with a comb-like series of minute, curved teeth on each side, and the distal end of the propodite bears a row of stout setæ. All the limbs except those of the first free segment have the distal end of the carpopodite crowned with a

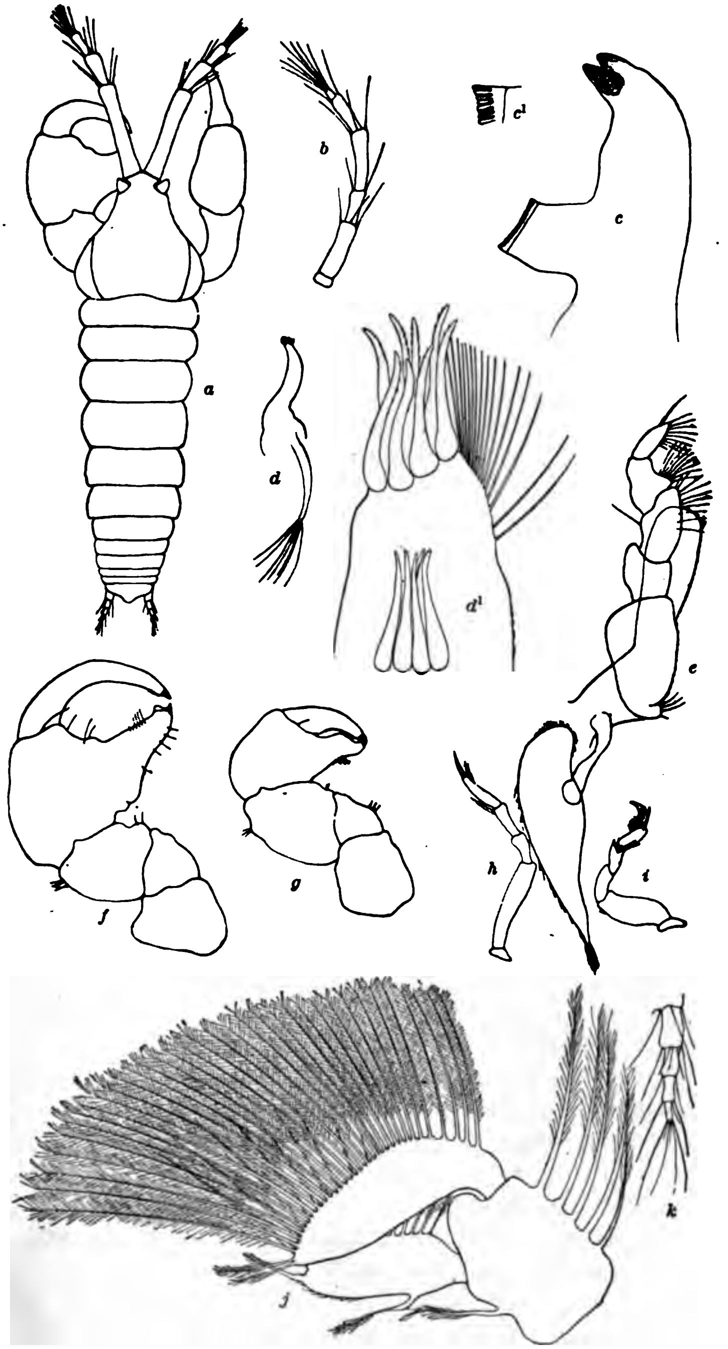

Fig. 15.—Tanais robustus (After Moore). *a*, General figure. *b*, Second antenna. *c*, Mandible. c^1, Detail of mandible. *d*, Anterior (first) maxilla. d^1, Tip of first maxilla. *e*, Maxilliped. *f*, First gnathopod of male. *g*, First gnathopod of female. *h*, First pereiopod. *i*, Last pereiopod. *j*, Pleopod. *k*, Uropod.

few stout spines, some bifid, others serrulate. Only the anterior three segments of the pleon bear limbs (pleopods). Each of these consists of a flat basal piece (protopodite), to which are attached two one-jointed blades, furnished on their outer edges with long pinnate setæ, the exopodite bearing about 35, the endopodite about 15. Both protopodite and endopodite bear a single stout seta on their inner edge.

"The last segment bears a pair of four-jointed setose limbs (uropods), the segments of which are cylindrical and increase in length from base to tip. The marsupia of the female are thin-walled pouches attached to the ventral wall of the sixth thoracic segment (fourth free segment). They increase in size with the development of the eggs and in some specimens extend over segments five to seven, to which, however, they are not attached.

"The largest specimens collected measure from rostrum to tip of pleon 4.7 mm. and in width 1.4 mm. The ground color in alcoholic specimens is pale yellow. Upon the carapace this is heavily mottled with brownish pigment, excepting over about thirty elliptical and subelliptical areolæ symmetrically arranged toward the middle line. The dorsal surfaces of the chelæ are similarly marked. The portion of the body and the limbs behind the carapace are much paler, being usually concealed in the tubular dwelling."—MOORE.[a]

The type specimens of this species were sent me from the University of Pennsylvania. As the bottle in which they were placed had been accidentally broken and the specimens allowed to dry up, they were not in a condition to redescribe, so I have quoted Doctor Moore's description, which is very full and accurate.

TANAIS NORMANI Richardson.

Tanais normani RICHARDSON, Proc. U. S. Nat. Mus., XXVIII, 1905, pp. 369–370.

Locality.—Monterey Bay, California.

Body narrow, elongate, 4 mm. long. : ¾ mm. wide.

Head as wide as long, with the anterior margin triangulate between the eyes, which are situated at the extreme antero-lateral angles. The head is half as wide anteriorly as it is posteriorly. The eyes are small, but distinct. The first pair of antennæ are composed of three articles, and have the first article longest, about two and a half times as long as wide; the second article is half as long as the first; the third is a little shorter than the second, and terminates in a bunch of long hairs. The second pair of antennæ are composed of five articles and have the first article about three times as long as the second; the third is twice as long as the second; the fourth is one and a half times longer than the second; the fifth article is minute and terminates in a bunch of hairs.

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[a] Proc. Acad. Nat. Sci. Phila., 1894, pp. 90–94.

The first segment of the thorax is united with the head to form a carapace. The second or first free segment is the shortest of all; the third and fourth or second and third free segments are nearly equal in length, the third being perhaps a little longer; the fifth and sixth or fourth and fifth free segments are subequal and are the longest; the sixth or seventh free segment is about equal in length to the third free segment.

The abdomen is composed of six segments. The first three are subequal in length and carry on the ventral side three pairs of well-developed pleopoda. The two following segments are subequal, and each is about one-half as long as any of the three preceding segments and about one-half as wide, being abruptly narrower. These segments do not carry pleopoda. There are thus only three pairs of pleopoda. The sixth or terminal segment is as wide as the two preceding segments and is rounded posteriorly. The uropoda are single branched; the peduncle is followed by a five-articulate branch.

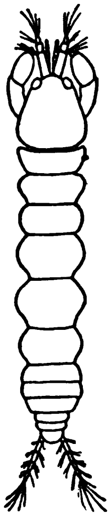
FIG. 16.—TANAIS NORMANI. × 11½.

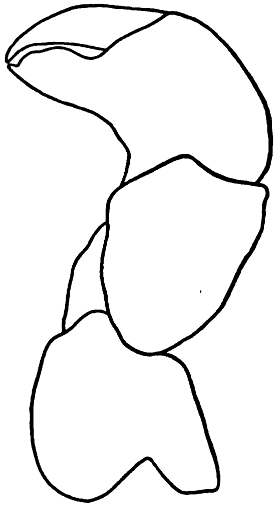
FIG. 17.—TANAIS NORMANI. FIRST GNATHOPOD. × 44.

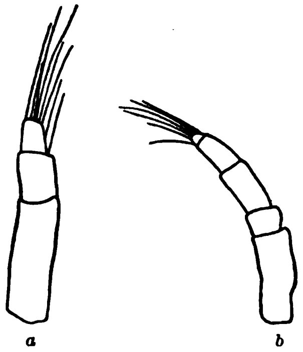

FIG. 18.—TANAIS NORMANI. *a*, FIRST ANTENNA. × 44. *b*, SECOND ANTENNA. × 44.

The first pair of legs or gnathopods are chelate; the following six pairs of legs are ambulatory.

Only three specimens of this species were collected by Mr. Harold Heath at Monterey Bay, California.

The types are in the U. S. National Museum. Cat. No. 30615, U.S.N.M.

This species differs from *Tanais alascensis* Richardson in having the abdomen composed of six segments, while in *T. alascensis* it is composed of five segments; in having the uropoda composed of a peduncle and five articles, while in *T. alascensis* the uropoda are composed of a peduncle and six articles; and in the smaller size of the specimens.

It is named in honor of Rev. A. M. Norman, the distinguished carcinologist.

3. Genus CRYPTOCOPE Sars.[a]

Eyes wanting. Abdomen composed of six segments. Pleopoda in female very small and rudimentary; those in the male well developed. Incubatory pouch formed of two lamellæ issuing from the bases of the fourth pair of legs. Uropoda in female short, biramose, rami very unequal; those in male much more fully developed. First gnathopods strong and similar in structure in both sexes. Mandibles well developed, with the cutting edge coarsely dentated, and having on the right mandible a rather large secondary lamella; molar expansion well defined.

CRYPTOCOPE ARCTICA Hansen.

Cryptocope arctica HANSEN, Dijmphna-Togt. zool.-bot. Udb., 1887, p. 209, pl. XXI, fig. 4; Vidensk. Meddel. Fra. den Naturh. Foren. i Kjöbh., 1887–88, p. 180, pl. VII, fig. 1–1c.—STEBBING, Ann. Mag. Nat. Hist. (7), V, 1900, p. 12.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 211; Proc. U. S. Nat. Mus., XXIII, 1901, p. 502.

Localities.—Greenland; Kara Sea; latitude 72° 20′ north, longitude 59° 39′ west.

Depth.—100–170 fathoms.

Description of female.—The body is subcylindrical, about four and a half times longer than wide.

The head becomes gradually narrower toward the front, with the anterior margin somewhat produced, the apex being obtuse. Eyes absent. The first pair of antennæ are composed of four tapering articles, and are one-fourth shorter than the head; the basal article is two-fifths the length of the antennæ, is cylindrical when seen from the side—seen from above, gradually stouter toward the base; the second article is more than one-half times longer than the third and somewhat shorter than the fourth article. Each article is furnished with setæ at the distal end of the external angle. The apex of the fourth article is furnished with numerous long setæ. The second pair of antennæ are slender, composed of five articles, and are somewhat shorter than the antennæ of the first pair.

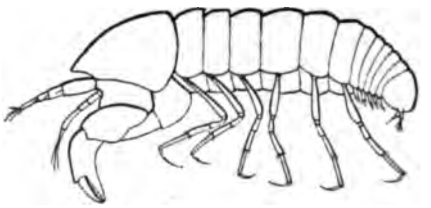

FIG. 19.—CRYPTOCOPE ARCTICA (AFTER HANSEN). (ENLARGED.)

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[a] See Sars for characters of genus.

The first three free segments of the thorax are subequal; taken together, somewhat shorter than the head and twice as long as the fourth free segment.

All the segments of the abdomen are present and visible. The last segment is tapering, widely rounded, and more than twice as wide as long.

The first pair of legs are robust; the chelæ are more than half as short as the head; the fingers are a little shorter than the hand, the thumb serrate almost to the apex. The ambulatory legs are all subequal, slender. The pleopoda are very short, and furnished with a few short setæ.

The uropoda are very short, double-branched, both branches being composed of two articles, the inner branch being twice as long as the outer branch, and stouter.

The marsupium is composed of two large lamellæ issuing from the base of the fifth pair of legs.[a]

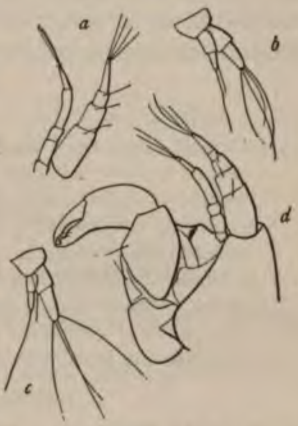

FIG. 20.—CRYPTOCOPE ARCTICA (AFTER HANSEN). *a*, ANTENNÆ OF FEMALE. *b*, UROPOD OF FEMALE. *c*, UROPOD OF MALE. *d*, ANTERIOR PART OF BODY OF MALE. (ENLARGED.)

4. Genus LEPTOGNATHIA Sars.[b]

Eyes wanting. Pleopods in female small and sometimes wanting; those in male well developed. Abdomen composed of six segments. Uropoda usually biramous, sometimes apparently simple, the outer

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[a] The above description is adapted from the following description of Hansen's:

Femina.—Corpus subcylindricum, circiter quadruplo et dimidio longius quam latius. Scutum cephalothoracicum ad frontem versus sensim angustatum, margine anteriore aliquantum producto et apice obtuso. Segmenta tria libera anteriora inter se subæqualia, simul sumpta scuto cephalothoracico aliquanto breviora et segmento quarto libero duplo longiora. Segmenta caudæ omnia manifesta; segmentum ultimum declive et valde rotundatum, plus duplo latius quam longius. Oculi nulli. Antennæ primi paris quadriarticulatæ, anguste conicæ; scuto cephalothoracico quarta parte breviores; articulus basalis duas quintas partes antennæ explens, a latere visus cylindricus, pronus ad basin versus sensim incrassatus; articulus secundus articulo tertio plus quam dimidio longior et articulo quarto nonnihil brevior; articulus uterque seta in angulo exteriore apicali instructus; apex articuli quarti setis compluribus longis ornatus. Antennæ secundi paris tenues, quinque-articulatæ, antennis primi paris nonnihil breviores. Pedes primi paris (chelipedes) robusti; chela scuto cephalothoracico plus quam dimidio brevior; digiti manu paulo breviores, pollice prope apicem serrato. Pedes gressorii omnes inter se subæquales, tenues. Pleopoda brevissima, setis nonnullis brevioribus instructa. Uropoda brevissima, biramea, ramis ambobus biarticulatis, ramo interno quam externo duplo longiore et crassiore. Marsupium e laminis duabus magnis, ad pedes quinti paris affixis, formatum est. Long. 1.67 mm.—HANSEN, Dijmphna-Togt. zool.-bot. Udb., 1887, p. 209.

[b] See Sars for characters of genus.

branch not being distinctly defined from the peduncle, branches unequal, inner one larger and biarticulate, outer one composed of one or two articles. Incubatory pouch normal. Mandibles small and feeble in structure, cutting part narrow, molar expansion forming a thin acuminate lappet armed at the tip with a few small denticles.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS LEPTOGNATHIA.

a. In female the inner branch of the uropoda is twice as long as the outer. The second or first free segment of the thorax is about two-thirds as long as the third, which in turn is about equal to the fourth and fifth. Sixth and seventh segments progressively somewhat shorter. Propodus of first pair of legs less robust than carpus................................ *Leptognathia cæca* (Harger)

a'. In female the inner branch of the uropoda is more than three times as long as the outer. The second or first free segment of the thorax is about the same size as the last one, both being shorter than the others. Propodus of the first pair of legs scarcely smaller than the carpus...... *Leptognathia longiremis* (Lilljeborg)

LEPTOGNATHIA CÆCA (Harger).

Paratanais cæca Harger, Am. Jour. Sci. (3), XV, 1878, p. 378.

Leptochelia cæca Harger, Proc. U. S. Nat. Mus., II, 1879, p. 164; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 427, 428; pl. XIII, fig. 91.

Leptognathia cæca Sars, Archiv for Math. og naturvid., 1882, p. 45.—Norman and Stebbing, Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, p. 110.—Richardson, American Naturalist, XXXIV, 1900, p. 211; Proc. U. S. Nat. Mus., XXIII, 1901, p. 502.

Localities.—Massachusetts Bay, off Salem; Provincetown, Massachusetts.

Depth.—Surface to 48 fathoms in soft mud.

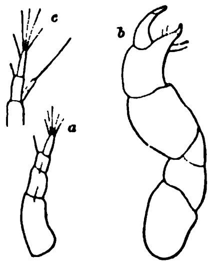

FIG. 21.—LEPTOGNATHIA CÆCA (AFTER HARGER). *a*, FIRST ANTENNA. × 50. *b*, LEG OF FIRST PAIR. × 50. *c*, UROPOD. × 50.

"This species is at once recognized among our Tanaids by the absence of eyes. The enlarged chelate claws joined to the united head and first thoracic segment, and the six-jointed pleon serve to distinguish it as belonging to the present genus.

"Body slender, elongated, and rather loosely articulated; head narrow in front, not broader than the bases of the antennulæ; eyes wanting; antennulæ distinctly four-jointed in the type specimen, first segment forming less than half the length of the organ, second segment longer than the third, last segment about as long as the second, slender, tapering, and tipped with setæ; antennæ attaining the tip of the third antennular segment. The first pair of legs are robust, but less so than in the preceding species (*Leptochelia filum*); they extend forward in the natural position about to the tips of the antennæ; they have the basal segment subquadrate, the hand or propodus less robust than the carpus, with a serrated digital process; dactylus short.

"The second or first free thoracic segment is about two-thirds as long as the third; this in turn is about equal to the fourth and to the fifth segments, while the sixth and seventh segments are progressively somewhat shorter. The second pair of legs are scarcely more slender than the following pairs, and the basal segments are not curved around the base of the first pair.

"The uropods are short and biramous; each ramus two-jointed. The outer ramus is more slender than the inner, half its length, and bears a long bristle at the tip.

"Length, 2.5 mm.; color, white."—HARGER.[a]

LEPTOGNATHIA LONGIREMIS (Lilljeborg).

Tanais longiremis LILLJEBORG, Upsala Univ. Arsskr., Math. og Naturv., I, 1865, p. 23–25.

Tanais islandicus G. O. SARS, Archiv for Math. og Naturv., Christiania, II, 1877, p. 346.

Leptognathia longiremis G. O. SARS, Archiv for Math. og Naturv., 1882, p. 41; Norwegian North Atlantic Expedition, 1876–1878, Crustacea, I, 1885, pp. 79–82, pl. VII, figs. 17–28; II, 1886, p. 26.—HANSEN, Dijmphna-Togtets zoologisk-botanske Udbytte, 1887, p. 185; Vidensk. Meddel. fra den Naturh. Foren. i Kjøbh., 1887–88, p. 179, pl. VI, figs. 9–9b. (See Hansen for synonymy.)—SCOTT, Ann. Scottish Nat. Hist., 1898, p. 220.—SARS, Crust. Norway, II, 1899, p. 27, pl. XII.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 211; Proc. U. S. Nat. Mus., XXIII, 1901, p. 502.—AXEL OHLIN,[b] Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 15–16.

Localities.—Kekertak, Greenland; Scotland; Norway; Iceland; Denmark; latitude 77° 9′ north, longitude 14° 40′ east, off Ice Islands; latitude 74° 35′ north, longitude 18° 23′ west, off Little Pendulum Island.

Depth.—7–200 fathoms; also shallow water.

Found in soft gray clay, in sandy mud and algæ.

"Body of female rather slender and elongated, more than seven times as long as it is broad; cephalosome about the length of the first two segments of mesosome combined, with the proximal half of uniform breadth, the distal one abruptly attenuated; first free segment of mesosome about same size as the last one, both being shorter than the others; metasome well developed, exceeding in length the last two segments of mesosome combined, terminal segment nearly occupying

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[a] Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 427–428.

[b] Hansen in Ohlin (Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 16–17, footnote) considers *Leptognathia longiremis* Sars as distinct from *Leptognathia longiremis* (Lilljeborg). He proposes to call it *Leptognathia sarsi* and considers that it differs in having the last segment of the abdomen armed on each side with a small denticle, in having the basal part of the uropoda rather short, the inner branch long, composed of two articles, the other branch short, composed of two joints, the hand of the chelipeds dentated on the inferior margin.

one-third of the length of metasome, and armed on each side with a minute deflexed denticle. Body of male much broader than in female, being scarcely more than five times as long as it is broad; cephalosome rather broad in proportion to its length; all free segments both of mesosome and metasome of about equal length, the terminal one narrowly produced at the tip. Superior antennæ in female gradually tapering distally, basal joint about equaling in length the other three combined, second joint shorter than the outer two taken together; those in male attaining in length one-fourth of the body, the first two joints of the peduncle large and expanded, flagellum about the length of the peduncle, and having the two outer joints much longer than the

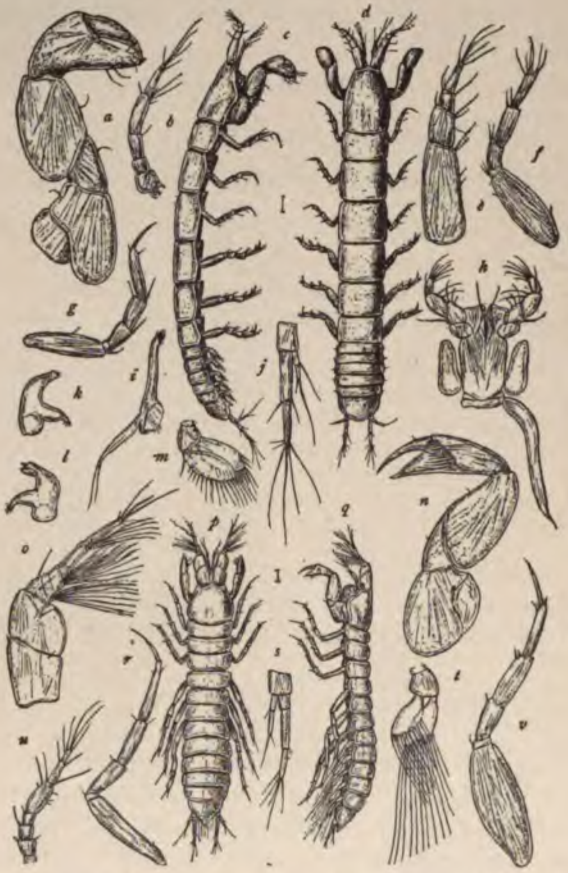

FIG. 22.—LEPTOGNATHIA LONGIREMIS (AFTER SARS). *a*, FIRST LEG OF FEMALE. *b*, SECOND ANTENNA OF FEMALE. *c*, LATERAL VIEW OF FEMALE. *d*, DORSAL VIEW OF FEMALE. *e*, FIRST ANTENNA OF FEMALE. *f*, SEVENTH LEG OF FEMALE. *g*, SECOND LEG OF FEMALE. *h*, MAXILLIPEDS. *i*, ANTERIOR (FIRST OR INNER) MAXILLA. *j*, UROPOD OF FEMALE. *k*, MANDIBLE (RIGHT). *l*, LEFT MANDIBLE. *m*, PLEOPOD OF FEMALE. *n*, FIRST LEG OF MALE. *o*, FIRST ANTENNA OF MALE. *p*, DORSAL VIEW OF MALE. *q*, LATERAL VIEW OF MALE. *r*, SECOND LEG OF MALE. *s*, UROPOD OF MALE. *t*, PLEOPOD OF MALE. *u*, SECOND ANTENNA OF MALE. *v*, SEVENTH LEG OF MALE.

other two. Chelipeds in female rather strong, with the hand considerably dilated, oval triangular in form, and scarcely smaller than the carpus, with a slight dentated crest in front at the insertion of the dactylus, the latter crested along the middle, thumb distinctly serrated at the end inside; those in male with the hand much narrower than in female, and furnished inside with a transverse row of about ten flattened spines increasing in length behind, fingers quite simple, pointed, the immovable one quite short. Uropoda in female attaining half the length of the metasome, both rami biarticulate, the inner one more than three times as long as the outer, and tipped by rather long setæ; inner ramus in male distinctly triarticulate. Length of female 3.75 mm., of male 2.55 mm."—G. O. Sars.[a]

5. Genus HETEROTANAIS Sars.[b]

Eyes distinct. Abdomen with all six segments well defined. Pleopoda normal, all five pairs present. Uropoda biramous, outer branch small, inner elongate and composed of four to five articles. Incubatory pouch normal. First gnathopods in female normal, in male very different, being imperfectly chelate, thumb very short, or transformed to a posteriorly-pointing lappet.

HETEROTANAIS LIMICOLA (Harger).[c]

Paratanais limicola Harger, Am. Jour. Sci., (3) XV, 1878, p. 378.

Leptochelia limicola Harger, Proc. U. S. Nat. Mus., II, 1879, p. 163; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, p. 424, pl. xiii, figs. 87–88.

Heterotanais limicola Sars, Archiv for Math. og Naturvid., 1882, p. 31.—Norman and Stebbing, Trans. Linn. Soc. London, XII, 1886, Pt. 4, p. 109.—Hansen, Videnskabelige Meddelelser fra den naturhistoriske Forening in Kjøbenhavn, 1887–1888, pp. 178–179.—Richardson, American Naturalist, XXXIV, 1900, p. 212; Proc. U. S. Nat. Mus., XXIII, 1901, p. 503.

Localities.—Massachusetts Bay, off Salem; Godthaab, Greenland (Hansen).

Depth.—Forty-eight fathoms in soft mud; 40–60 fathoms.

Body narrow, elongate, 2 mm. long and less than ⅓ mm. wide.

Head a little longer than wide, gradually becoming narrower from the base to the anterior end. Eyes "small and inconspicuous." The first pair of antennæ have the first article very long; the second article is only one-fourth as long as the first; the third is almost twice as long as the second. The second pair of antennæ have the first two articles short and subequal; the third article is as long as the first two taken together; the fourth is about half as long as the third. The second pair of antennæ are shorter than the first pair, not extending much beyond the end of the second article of the first pair.

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[a] Crust. of Norway, II, 1899, p. 27.

[b] See Sars for characters of genus, Crust. of Norway, II, 1899.

[c] See Harger for description of this form.

The first free segment of the thorax is a little shorter than any of those following. The second and third free segments are subequal, and each is a little longer than the first segment. The fourth and fifth free segments are subequal, and each is longer than either of the two preceding segments. The last free segment is shorter than either of the two preceding segments, and is about as long as the second and third segments.

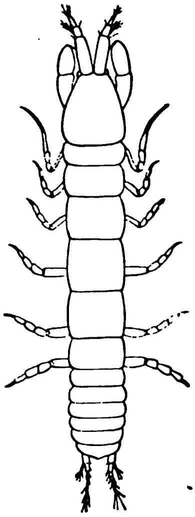

FIG. 23.—HETEROTANAIS LIMICOLA (AFTER HARGER). FEMALE. × 20.

The abdomen is composed of six segments, five short, subequal ones anterior to the terminal segment, which has the posterior margin rounded.

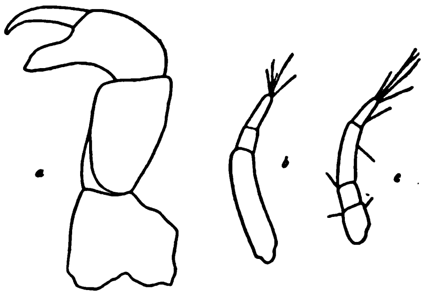

FIG. 24.—HETEROTANAIS LIMICOLA. a, FIRST LEG OF FEMALE. × 77½. b, FIRST ANTENNA. c, SECOND ANTENNA. × 77½.

The uropoda are double-branched. The inner branch is composed of five articles; the outer branch has two articles.

The first pair of legs or gnathopods are chelate. All the other six pairs are ambulatory. The dactylus of the second pair of legs is longer than the propodus.

There are five pairs of well-developed pleopoda.

I have seen only one rather imperfect specimen.

6. Genus LEPTOCHELIA Dana.[a]

Gnathopods in male with chelæ fully developed, very much elongated; fingers elongate and curved, with immovable one strongly tuberculate within. Marsupium of female composed of eight large lamellæ issuing from the first four free segments. Eyes present. Five pairs of pleopoda present. Uropoda double-branched; inner branch multiarticulate; outer branch composed of one or two articles. Gnathopods in female strong. First pair of antennæ in female composed of three articles and a rudimentary flagellum. First antennæ in male much more elongated and with a multiarticulate flagellum.

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[a] See Stebbing for characters of genus, Trans. Zool. Soc. London, 1886, XII, p. 108.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS LEPTOCHELIA.

a. Outer branch of uropoda composed of two articles.. *Leptochelia forresti* (Stebbing)

a′. Outer branch of uropoda composed of one article.

  b. Inner branch of uropoda composed of six articles.. *Leptochelia savignyi* (Krøyer)

  b′. Inner branch of uropoda composed of less than six articles.

    c. Inner branch of uropoda composed of five articles.

      d. First pair of antennæ in male with basal segment about one-third the length of organ, or about two-thirds as long as the body. Chelipeds in male with digital process of propodus armed with two teeth. Carpus extends to the extremity of basal article of first pair of antenna.
Leptochelia dubia (Krøyer)

      d′. First antennæ in male with basal article one-half the length of entire organ. Chelipeds in male with digital process armed with one low, obtuse tooth near the base and one more prominent one near the tip. Carpus of chelipeds more than half the length of the body, longer than the peduncle of the first antennæ and about half as long as the body.
Leptochelia rapax Harger

    c′. Inner branch of uropoda composed of three or four joints.
Leptochelia? filum (Stimpson)[a]

LEPTOCHELIA FORRESTI (Stebbing).

Dolichochelia forresti Stebbing, Ann. Mag. Nat. Hist. (6), XVII, 1896, pp. 49–56.
Leptochelia minuta Stebbing, Ann. Mag. Nat. Hist. (6), XVII, 1896, pp. 156–160.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 503–504.
Leptochelia forresti Stebbing, Willey's Zool. Results, 1902, p. 615.

Locality.—West Indies.

Depth.—Shallow water.

"The front margin of the head shield projects but slightly, forming a very obtuse angle, the corners being shallowly excavate for the ocular lobes. The part of the shield to which the first gnathopods (or chelipeds) are attached is wider than the front. The pleon at its base is as wide as the trunk, but narrows distally with a gentle curve; the sixth segment, which is very little longer than that preceding it, ends in an obtuse angle similar to that of the frontal margin.

"The eye lobes have a convex outer margin and are not very sharply pointed in front. The pigment is black in the mounted specimen.

"*First antennæ.*—These are as long as the animal from the front of the head to the apex of the pleon. The first joint is dilated at the base, for the rest slender, its length forming two-fifths of the whole antenna. The second joint is rather less than three-fourths the length of the first. The third is a fifth of the length of the second, and so slender as to look like a part of the flagellum, among the eight joints of which the first is the shortest. The joints carry two or three setæ apiece, giving an appearance very unlike that produced by the conspicuous sensory filaments in the adult males of *Leptochelia* and *Heterotanais*.

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[a] The uropoda are described as four to five jointed. If the peduncle is counted as the first one of these the branch is then three to four jointed. Nothing is known of the outer branch, but in the table I have placed it with those species in which the outer branch is one-jointed, as this is the case with the larger number of species in this genus.

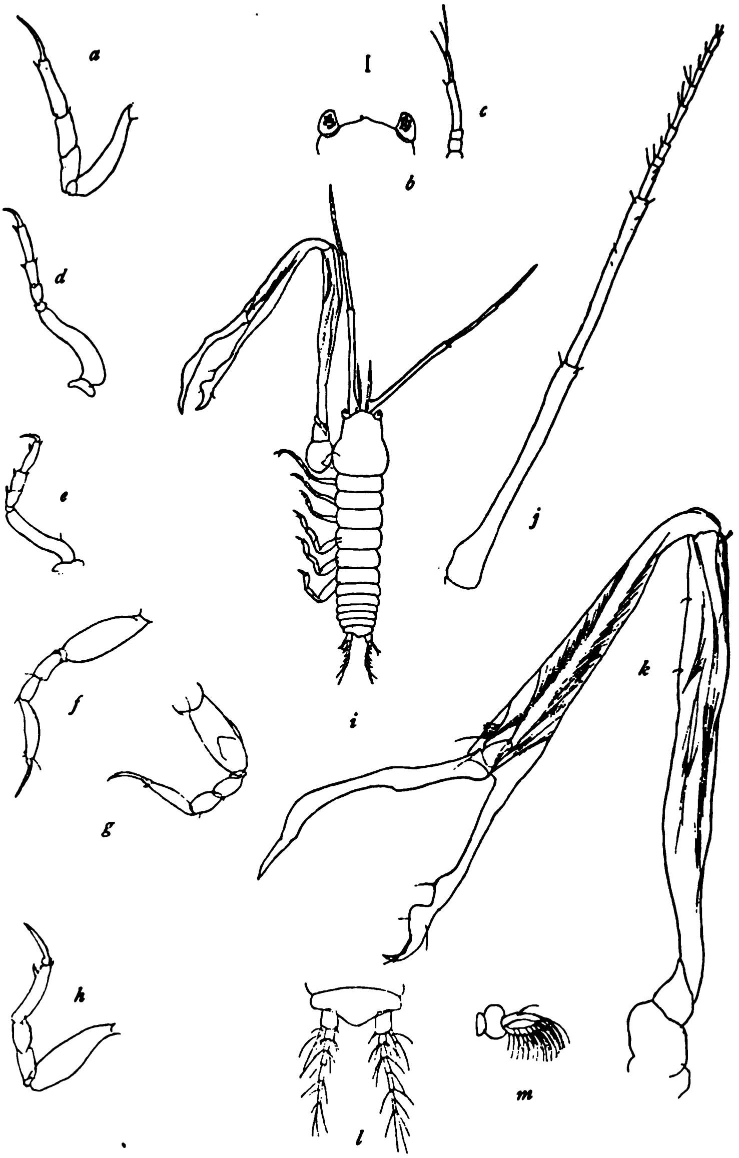

FIG. 25.—LEPTOCHELIA FORRESTI (AFTER STEBBING). *a*, SECOND GNATHOPOD. *b*, FRONT OF HEAD WITH EYES. *c*, UPPER ANTENNA. *d*, THIRD LEG. *e*, FOURTH LEG. *f*, FIFTH LEG. *g*, SIXTH LEG. *h*, SEVENTH LEG. *i*, GENERAL FIGURE. *j*, LOWER ANTENNA. *k*, FIRST GNATHOPOD OF RIGHT SIDE. *l*, TERMINAL PORTION OF ABDOMEN WITH UROPODA. *m*, PLEOPOD.

"*Second antennæ*.—The first three joints are very small, together not equal to the fourth. The fifth is two-thirds the length of the fourth and is distally armed with a seta. The minute tubercle which represents the flagellum carries two setæ. The whole antennæ is shorter than the flagellum in the first pair.

"*First gnathopods.*—These chelipeds are remarkable, both for the threatening gape of the chela and for their length, which is double that of the animal's body. The second joint is the stoutest, yet not much dilated, a little longer than broad. The third joint is short, almost triangular. The fourth is of great length, narrowest near the base, and nowhere very wide. The fifth is still longer, with a curvature at its base, adapted for the folding together of these long slender joints; its narrow immovable digit forms less than half of the total length of the joint and ends in a sort of pointed claw over which three setules are distributed, another setule occupying a small prominence of the inner margin near the base of the claw. The movable finger is somewhat longer than the immovable one, slender, pointed, curved, with irregular margins.

"*Second gnathopods.*—As usual in this group, these are gnathopods only in name, and differ but slightly from the following ambulatory feet. They are scarcely, if at all, larger than the fifth peræopods, having the second joint narrower, but the fourth and fifth joints a little wider than is the case in that pair.

"*Peræopods.*—The general structure is the same in all. The second joint is the longest, in the last three pairs somewhat dilated. The third joint is very short, the fifth joint is a little longer than the fourth, and the sixth considerably longer than the fifth. There are some spinules about the distal end of the sixth joint. In the first and second pairs the finger is small, in the other three pairs it is nearly as long as in the second gnathopod.

"*Pleopods.*—All the five pairs are constructed as in *Leptochelia.*

"*Uropods.*—The peduncles are a little longer than broad. The inner branch has six joints, of which the first is the widest, the fourth the longest. The outer branch has two joints, together not equaling the length of the first joint of the inner branch. All the joints of the branches are setiferous.

"*Length.*—From head to tail the specimen measured less than a tenth of an inch. From an unmounted specimen with which Mr. Forrest has favored me since the above description was passed for press, it appears that the lateral margins of the head anteriorly are slightly concave; that the first three free segments of the peræon are very decidedly shorter and a little broader than the following three; that, viewed dorsally, there is a constriction between the third and fourth and between the fourth and fifth free segments, and that the first five segments of the pleon are slightly broader than the immediately preceding segments of the peræon. In both specimens the mou parts appear to be in a very rudimentary condition."—STEBBING.[a]

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[a] Ann. Mag. Nat. Hist. (6), XVII, 1896, pp. 49-56.

LEPTOCHELIA SAVIGNYI (Krøyer).

Tanais savignyi Krøyer, Nat. Tidsskrift, IV, 1842, p. 168, pl. II, figs. 1–12 (female).

Tanais edwardsii Krøyer, Nat. Tidsskrift, IV, 1842, p. 181, pl. II, figs. 13–19 (male).

Leptochelia edwardsii Bate and Westwood, Brit. Sessile-eyed Crustacea, II, 1866, p. 134 (male).

Tanais filum Harger (not Stimpson), Report U. S. Comm. of Fish and Fisheries, Pt. 1, 1873, p. 573 (male and female).

Paratanais algicola Harger, Am. Journ. Sci. (3), XV, 1878, p. 377 (both sexes).

Leptochelia algicola Harger, Proc. U. S. Nat. Mus., II, 1879, p. 162; Report U. S. Comm. of Fish and Fisheries, Pt. 6, 1880, pp. 421–423 (male and female).

Paratanais savignyi Delage, Arch. zool. expérim., 1881, p. 134, pl. XI, figs. 1–8 (female).

Leptochelia savignyi Sars, Archiv. for Math. og Naturvid., 1882, p. 25.

Leptochelia dubia Sars (not Krøyer), Archiv. for Math. og Naturvid., 1882, p. 26.

Leptochelia savignyi G. O. Sars, Archiv. for Math. og Naturvid., Christiania, XI, 1886, p. 326, pl. IX, figs. 4–8 (male and female).

Leptochelia dubia Sars (not Krøyer), Archiv. for Math. og. Naturvid., Christiania, XI, 1886, p. 317, pls. X, XI (male and female).

Leptochelia savignyi Dollfus, Mém. de la Soc. zool. de France, XI, 1898, pp. 40–43.

Leptochelia algicola Dollfus Mém. de la Soc. zool. de France, XI, 1898, pp. 41–43.

Leptochelia savignii Norman, Ann. Mag. Nat. Hist. (7), III, 1899, p. 333.

Leptochelia savignyi Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 503.

Leptochelia dubia Richardson (not Krøyer), Proc. U. S. Nat. Mus., XXIII, 1901, p. 504.

Localities.—Provincetown, Massachusetts; Woods Hole, Massachusetts; Vineyard Sound; Noank, Connecticut; Long Island Sound; Great Egg Harbor, New Jersey; also England; Belgrave Bay, Guernsey; Sark; Jersey; Naples; Trieste; Spezia; Messina; Syracuse; Atlantic coast from Brittany to Senegal; Birterbuy Bay, Ireland; Falmouth Harbor; Valentia, Ireland; France; Azores; Mediterranean; Madeira.

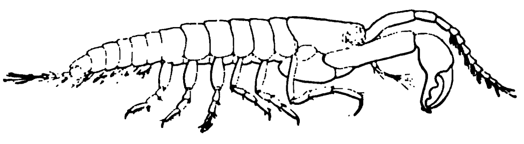

Fig. 26.—Leptochelia savignyi (after Harger). Male. × 20.

Depth.—Found on surface, among eelgrass and algæ.

There seems to be no sufficient reason for keeping *L. algicola* Harger and *L. savignyi* (Krøyer) distinct. The female of *L. algicola* agrees with Krøyer's description of *L. savignyi* in having the inner branch of the uropoda six-jointed. The first pair of antennæ are usually composed of three articles, but some specimens from Long Island Sound in the U. S. National Museum have the last articles of the first antenna sometimes divided into two articles. The male of *L. algicola*

Harger agrees with the male of *L. savignyi* described as *L. edwardsii* by Krøyer in having the first pair of antennæ composed of eleven articles. Some of the specimens have the first antenna composed of only ten articles. Krøyer describes the uropoda as having the inner branch seven-jointed, but the specimen sent to Professor Harger from Rev. A. M. Norman and labeled *L. edwardsii* agreed with the specimens of *L. algicola* in having the inner branch of the uropoda six-jointed. Dollfus points out that the two teeth on the propodus of the chelipeds are nearer together in the males of *L. algicola* than in the males of *L. savignyi*, but further states that this character may be due to a difference in the state of development, and not be of real specific value.

Description of male.—Body narrow, elongated, 2 mm. long, ½ mm. wide.

Head a little longer than wide, with the anterior portion narrower than the posterior portion. Eyes large, distinct. First pair of antennæ greatly elongated. The basal article is very long and narrow, and is about equal to the length of the head. The second article is a little more than one-third as long as the basal article. The third is one-half as long as the second. The flagellum is composed of seven or eight articles. The second pair of antennæ are short, and do not reach the extremity of the basal article of the first pair of antennæ.

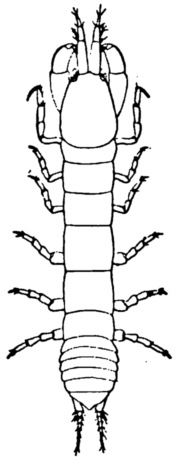

FIG. 27.—LEPTOCHELIA SAVIGNYI (AFTER HARGER). FEMALE. × 20.

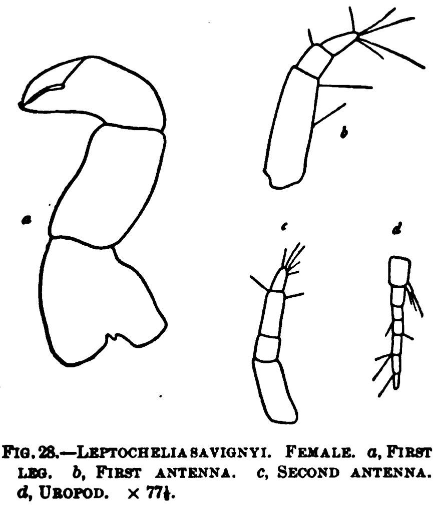

FIG. 28.—LEPTOCHELIA SAVIGNYI. FEMALE. *a*, FIRST LEG. *b*, FIRST ANTENNA. *c*, SECOND ANTENNA. *d*, UROPOD. × 77½.

The first segment of the thorax is coalesced with the head. The second or first free segment is the shortest. The third and fourth or second and third are subequal and each is a little longer than the first. The fifth and sixth or fourth and fifth free segments are the longest and are subequal; they are nearly twice as long as the first segment. The seventh or sixth free segment is shorter than either of the two preceding segments and about equal in length to the third free segment.

The abdomen is composed of six segments, five subequal ones anterior to the terminal segment, which posteriorly is triangular, with apex rounded. There are five pairs of well-developed pleopoda.

uropoda are double branched, the inner branch being composed of six articles, the outer one being composed of one short article.

The first pair of legs are greatly elongated and extend some distance in front of the head. The carpus is long and narrow and extends to the end of the basal article of the first pair of antennæ. The propodus has the distal extremity produced in a long, narrow, strongly curved process or thumb, which is armed within on the inner side with two triangular processes or teeth. The dactylus is also long and narrow, strongly curved, and furnished with stiff hairs on the inner margin. All the other legs are ambulatory.

Description of female.—Body narrow, elongate, about five times longer than wide, ½ mm.: 2½ mm.

Head longer than wide, becoming gradually narrower from the base to the anterior end. The anterior margin is very slightly produced in an obtuse point. The eyes are small, round, composite, and situated at the antero-lateral angles of the head. The first pair of antennæ have the first article long and robust; the second is less than half as long as the first; the third is a little longer than the second. This article in some specimens is subdivided. The second pair of antennæ are shorter than the first pair. The first article is long; the second article is less than half as long as the first; the third is twice as long as the second; the fourth is half as long as the third.

The first segment of the thorax is united with the head to form a carapace. The following six segments are free. The first free segment or second thoracic segment is a little shorter than the two following, which are subequal. The fourth and fifth free segments or the fifth and sixth segments are a little longer than either of the two preceding ones. The last segment is a little shorter than any of the four preceding segments, but is as long as the first segment.

The abdomen is composed of six segments, five short ones, subequal in length, anterior to the terminal segment, which has the posterior margin rounded. The uropoda are composed of a peduncle with two branches. The inner branch is composed of six articles. The outer branch has only one article.

There are five pairs of well-developed pleopoda.

The first pair of legs are chelate. The other six pairs are ambulatory. The dactylus of the second pair of legs is longer than in those following, but is not as long as the propodus.[a]

LEPTOCHELIA DUBIA (Krøyer).

Tanais dubius Krøyer, Nat. Tidsskrift, IV, 1842, p. 178, pl. II. figs. 20–22.

Leptochelia dubia Richardson, Trans. Conn. Acad. Sciences, XI, 1902, p. 279.

Leptochelia incerta Moore, Bull. U. S. Comm. of Fish and Fisheries, Pt. 2, XX, 1902, pp. 165–166.

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[a] See Harger for full description of this species.

Localities.—Brazil (Krøyer); Bermudas, at Castle Harbor (Richardson); Arroyo and Culebra, Porto Rico (Moore).

Found in dead coral.

This species seems to agree with *Leptochelia savignyi* (Krøyer), with the exception that both males and females have the inner branch of the uropoda composed of five articles instead of six.

It seems best to keep this species distinct from *Leptochelia savignyi*, although they are hardly to be distinguished except for the difference in the number of articles to the inner branch of the uropoda. The female of *L. algicola* has been placed in the synonymy of *L. dubia* by various authors, notably Sars and Norman, and I have also previously followed their example. Now, however, I am inclined to think, with Dollfus, that both the male and female of *L. algicola* should be placed in the synonymy of *L. savignyi*, inasmuch as they both agree in having the inner branch of the uropoda six-jointed in both sexes, whereas *L. dubia* in both sexes has the inner branch of the uropoda composed of only five articles.

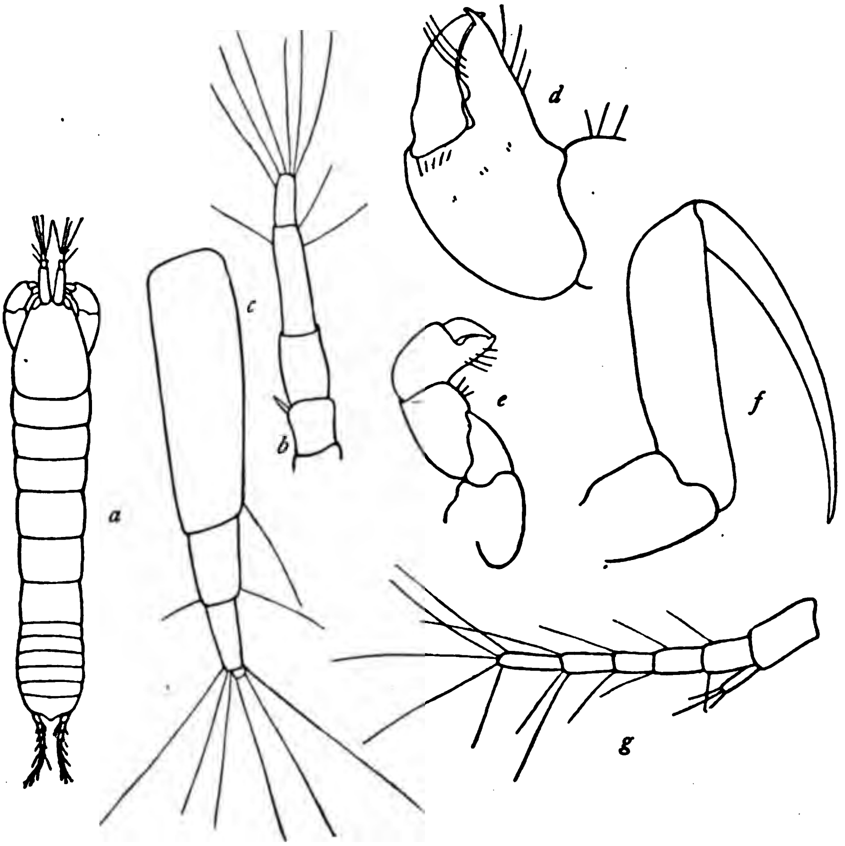

Fig. 29.—Leptochelia dubia (After Moore). *a*, General figure. × 14. *b*, First antenna. × 77. *c*, Second antenna. × 77. *d*, Chela. × 77. *e*, Cheliped. × 33. *f*, End of second leg. × 77. *g*, Uropod. × 77. (Female).

LEPTOCHELIA RAPAX Harger.[a]

Leptochelia rapax HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 163; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 424–426, pl. XIII, figs. 89, 90.—SARS, Archiv. for Math. og Naturvid., 1882, p. 28.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 212; Proc. U. S. Nat. Mus., XXIII, 1901, p. 503; Trans. Conn. Acad. Sciences, XI, 1902, p. 279.

Localities.—Annisquam, Massachusetts; and the Bermudas.

Depth.—3 ft. on muddy bottom; ½ fathom. Lives in tubes.

Body narrow, elongate, about four times as long as wide, 1 mm.: 4 mm.

Head as wide as long, 1 mm.:1 mm., with the anterior margin between the eyes triangularly produced. The eyes are small, round, composite, and situated on the produced antero-lateral angles of the head. The first pair of antennæ are extremely long in the male; the first article is 1½ mm. long, or longer than the head; the second article is one-half as long as the first; the third is one-half as long as the second. The flagellum is composed of seven articles. The second pair of antennæ are very short and feeble as compared with the first antennæ, and extend only half the length of the first article of the second antennæ. The first article of the second antennæ is about equal in length to the second; the third is a little shorter than the second, and is furnished with hairs at the tip.

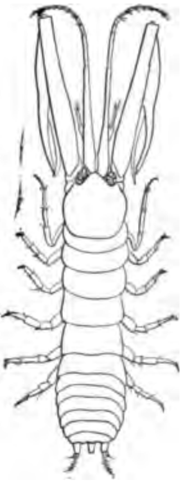

FIG. 30.—LEPTOCHELIA RAPAX (AFTER HARGER). MALE. × 12.

The first segment of the thorax is coalesced with the head. The six following free segments are about equal in length, with the exception of the first, which is a little shorter than any of the others.

The abdomen is composed of six segments, subequal in length, the last segment not having the lateral parts developed as in the five preceding segments. The uropoda are double branched. The inner branch is composed of five articles. The outer branch is composed of only one article. The peduncle of the uropoda is about as long as wide. There are five pairs of well developed pleopoda attached to the first five segments of the abdomen. Between the uropoda and arising from the ventral side is a long narrow plate, probably attached to the fifth abdominal segment; it terminates in a rounded extremity.

The first pair of legs in the male are very much elongated and extend a great distance in front of the head. The carpus is about half the length of the entire body; the propodus is as long as the carpus, the digital process being more than half the length of the carpus, and armed on the inner side near the base with a small triangular process and near the distal end with a larger process; the dactylus is more than half the length of the propodus and is strongly curved. The six following pairs of legs are small and similar in shape, the dactylus in the second pair being only about twice as long as in any of the other five pairs. The dactylus in the last three pairs is more curved than in the three preceding pairs.

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[a] See Harger for more detailed description of this species.

In the female the first pair of antennæ are not elongated; the second and third articles are subequal and each is about half as long as the first. There is no flagellum. The first pair of legs is not elongated; the second pair have the dactylus elongated as in the male.

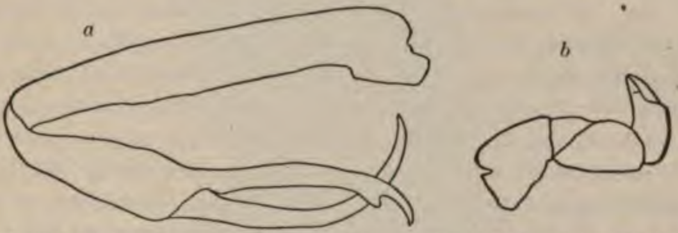

Fig. 31.—Leptochelia rapax. *a*, First leg of male. × 27½. *b*, First leg of female. × 27½.

LEPTOCHELIA? FILUM (Stimpson).

Tanais filum Stimpson, Smithsonian Contributions to Knowledge, VI, 1853, p. 43.—Harger, Am. Jour. Sci., (3) XV, 1878, p. 378.

Leptochelia filum Harger, Proc. U. S. Nat. Mus., II, 1879, p. 164; Report U. S. Comm. of Fish and Fisheries, 1880, Pt. 6, p. 427.—Sars, Archiv for Math. og Naturvid., 1882, p. 28.—Richardson, American Naturalist, XXXIV, 1900, p. 212; Proc. U. S. Nat. Mus., XXIII, 1901, p. 504.

Localities.—The Hake Bay, Grand Menan; Gulf of St. Lawrence.

Depth.—Eight fathoms, on a sandy bottom; 20 fathoms among *Ascidiæ callosæ.*

"Very minute, slender, rounded on the back, white, looking very much like a short piece of thread. Head small, and rather narrowed in front; first thoracic segment of great length; the second half as long as the third, which is about equal in length with the fourth, fifth, and sixth; the seventh being a little shorter than the sixth. The segments of the abdomen are well defined, the first five equaling each other in length, and the terminal one longer than the fifth, but narrower, and rounded behind. Antennæ short and thick, without flagella, with blunt tips crowned with few hairs, as are also their articulations. The inner ones are directed forward, and much the stoutest, especially toward their bases; while the outer ones are more slender and curve outward and backward. First pair of legs exceedingly thickened, with very large ovate hands and strong curved fingers. They are generally closely applied against the breast. The remaining thoracic feet are very slender, terminating in sharp, slender fingers, which in the second pair are very long and nearly straight, and in the other pairs short. The legs of the posterior pair are a little the longest and thickest. The ambulatory feet, in five pairs, are of great length and resemble those of the Amphipods. The caudal stylets are in length about four-fifths that of the abdomen, and consist of four or five articles with few hairs, each article becoming narrower, the last one with a tuft of few hairs at its extremity. Length, .15 inch; breadth, .02. Dredged among *Ascidiæ callosæ* in 20 fathoms in the Hake Bay."—STIMPSON.[a]

7. Genus NEOTANAIS Beddard.[b]

First pair of antennæ (in the male) with a three-jointed peduncle and a flagellum of four joints. Second pair of antennæ with a five-jointed peduncle and a short four-jointed flagellum. Chelæ fully developed and of normal structure in male. Exopodite of uropoda two-jointed; endopodite eight-jointed. Thoracic appendages specialized into an anterior and posterior series; in the three anterior thoracic appendages the distal joint is a simple, elongated, somewhat curved claw; in the posterior appendages this terminal joint is furnished at its extremity with a circlet of stout spines and a long, mesially placed, slender hair.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS NEOTANAIS.

a. Rostrum blunt. Ocular lobes minute but separate..*Neotanais americanus* **Beddard**
a′. Rostrum sharp. Ocular lobes not distinct.
Neotanais hastiger (**Norman and Stebbing**)

NEOTANAIS AMERICANUS Beddard.

Neotanais americanus BEDDARD, Proc. Zool. Soc. Lond., 1886, pp. 117–118; Challenger Report, XVII, 1886, pp. 124–125, pl. XVI, figs. 4–6.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 212; Proc. U. S. Nat. Mus., XXIII, 1901, p. 504.

Localities.—Southeast of New York; latitude 38° 34′ north, longitude, 72° 10′ west; and latitude 35° 39′ south, longitude 50° 47′ west.

Depth.—1,240 fathoms.

"The present species is the only representative of this new genus. The specific as well as the generic characters depend upon the examination of two male specimens, each of which measures about 6 mm. in length.

"The body is depressed and elongated, everywhere of approximately the same diameter. It is smooth both dorsally and ventrally, with no hairs or spines.

"The cephalothorax is pear-shaped, narrower anteriorly and wider posteriorly; it is about as long as the first two segments of the thorax

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[a] Smithsonian Contributions to Knowledge, VI, 1853, p. 43.

[b] See Beddard for characters of genus.

taken togethe [illegible] terminates in the middle line in a very short, bl [illegible] side of the shallow excavations which lodge th [illegible] tennules are the minute but separate ocular lob [illegible] oval in front, the anterior end being pointed an [illegible] o trace of any ocular structures. The first free th [illegible] er, rather more than half the length of the four [illegible] which are subequal; the last thoracic segment is [illegible] oing; each of these segments is rather narrower [illegible] iculates with the segment in front; the general s [illegible] short, oblong, with rounded angles; this does no [illegible] to the last free segment of the thorax, which are [illegible] long.

"The five anterior s [illegible] n are equal in length and in diameter, only the fi [illegible] nger than the rest.

"The terminal segme [illegible] nger and wider than the rest; it has a pair of late [illegible] ich the uropoda articulate; posteriorly it is rou [illegible] ian triangular process projects from the extremi [illegible] his the posterior margin of the abdomen is sligh [illegible]

"The antennules are co [illegible] n the antennæ; the peduncle has three joints, of [illegible] e is much the longest and stoutest; it is furnish [illegible] or four) of slender spines on the outer side, near [illegible] the second joint; the second joint is about one-f [illegible] the first, and like it has a tuft of slender spines o [illegible] ition to those of the basal joint, and one slender [illegible] e opposite side; the third joint of the peduncle is [illegible] e or two short slender spines upon the inner as [illegible] in just before its articulation with the flagellum [illegible] four joints, of which the first is very much the [illegible] ader than the succeeding joints; each of the thre [illegible] shed with a single olfactory hair.

"The antennæ are considerably m [illegible] r than the antennules; the peduncle consists of fi [illegible] asal joint is short and oval, much stouter than any of the [illegible] ceeding joints, which are of equal thickness; the second joint is moderately long, the third stouter, the fourth and fifth subequal to each other and to the second joint; the flagellum has four joints which decrease gradually in diameter, the first being the widest; the first joint of the flagellum is also the longest, the two middle ones are shorter and subequal, the fourth shorter still and provided at its extremity with a tuft of fine hairs.

"As the only specimen was mounted on a slide in Canada balsam it is impossible to describe in a detailed manner the mouth appendages, which do not appear, as far as could be seen, to present any marked differences from those of other species.

"The chelæ are short and very stout; the second joint is particularly stout, as compared with the others; the third joint as usual is very small, a portion of the fourth coming to articulate directly with the second; in the fifth joint the palm is straight for the first half, the margin being fringed with fine, closely-set denticles; the distal half is furnished with blunt tooth-like processes, and is bent downward at an oblique angle; it terminates in a short pointed extremity which is bent upward; toward the distal extremity are a few slender hairs scattered here and there; the finger gradually narrows toward its termination in a curved pointed extremity; the inner margin is provided with a number of low tooth-like processes, each terminating in a sharp point which is directed forward.

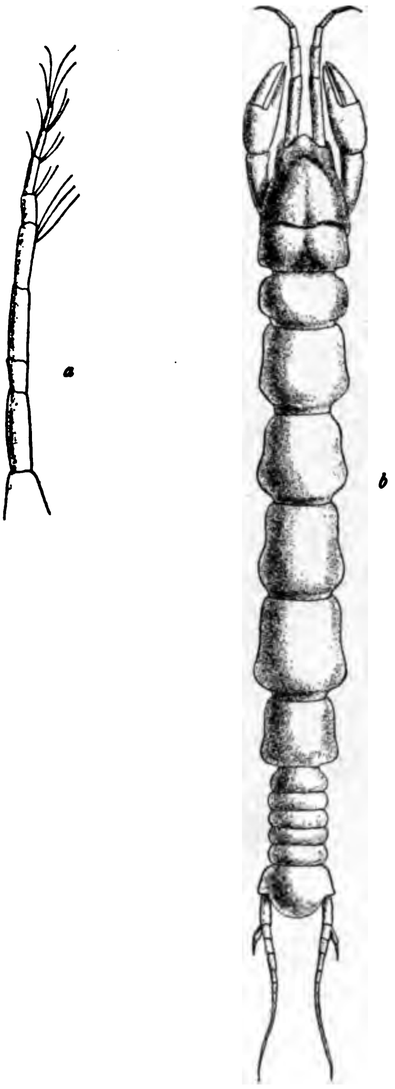

FIG. 32.—NEOTANAIS AMERICANUS (AFTER BEDDARD). *a*, SECOND ANTENNA. *b*, GENERAL FIGURE.

"The remaining thoracic limbs are more or less similar to each other; there is no difference in size between the anterior and posterior series, but a slight difference in structure; the proximal joint is very long, the second extremely short; the third is about half the length of the proximal joint, the fourth and fifth are rather shorter and subequal; the terminal joint of the limb has the form of a long slender spine; the inner margin of the penultimate joint has a row of stout spines, of which the distal one or two are serrate; on the opposite side of the joint are a number of more slender hair-like spines; the antipenultimate joint has a similar structure, but the spines are not so strong; the distal joints are nearly smooth, having only a very few slender hairs developed at the point of articulation with the succeeding joints. The above description applies to the first three pairs of ambulatory limbs. The fourth, fifth, and sixth pairs of thoracic appendages differ slightly in their structure from the anterior pairs; this difference mainly concerns the terminal joint of the limb, which is considerably more elongated than in the anterior appendages; it terminates in a fringe of short spines and mesially in a long slender spine which is of about half the length of the joint.

"On the abdomen all the appendages are present, but they present no special features of interest, with the exception of the uropoda, which have a typical structure.

"The basal joint of the uropoda is very stout and long, and with it articulates the minute two-jointed exopodite, as well as the long slender endopodite, which is made up of eight separate joints, all of which have tufts of hairs near to their articulation with the succeeding joints. Both the endopodite and the exopodite end in a tuft of slender hairs; the length of the uropoda is nearly equal to that of the abdomen.

"Another example of this species was dredged in the North Atlantic from a depth of 1,250 fathoms; it presents certain slight differences from the above-described species; these differences have reference to the proportionate length of the thoracic segments. Seeing, however, that the two specimens come from widely distant localities, it appears to be unnecessary to found a specific distinction between the two individuals, at least for the present. The present specimen is stouter and more robust than the last, but of equal length; the cephalothorax is nearly as long as the first three segments of the thorax taken together; the thoracic segments gradually increase in length up to the fourth; the fifth and sixth segments are subequal and about as long as the third."—BEDDARD.[a]

NEOTANAIS HASTIGER (Norman and Stebbing).[b]

Alaotanais hastiger NORMAN and STEBBING, Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, pp. 113, 114, pl. XXIII, fig. 2.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–1888, p. 178.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 212; Proc. U. S. Nat. Mus., XXIII, 1901, p. 502.

Locality.—Latitude 59° 11′ north, longitude 50° 25′ west.

Depth.—1,750 fathoms.

"This species comes very near to the last (*N. serratispinosus*). It differs from it in having the eye processes relatively larger, and in the massiveness of the hand and finger of the first gnathopods; in these organs all the parts are thickened and straightened without any proportionate increase in length. The effect of this is to make the inner edge of the thumb and finger overlap when closed all along the line, except for a small triangular space near the root of the thumb. The uropods have the inner branch nine, the outer two-jointed.

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[a] Challenger Report, XVII, 1886, pp. 124–125.

[b] Stebbing says that without doubt *Alaotanais* is a synonym of *Neotanais*. Hist. Crust., 1893, p. 324.

"But the characters which at once distinguished this species from all others known to us are to be found in the microscopic armature of the limbs. All the peræopods are everywhere beset with long, very slender spines, the whole of which, under high powers, are found to be covered with minute prickles. There are no toothed spines, such as are found in *Alaotanais serratispinosus*, the corresponding limb to which in *A. hastiger* has the finger long, narrow, and curved, and surrounded by a series of long, very slender spines, which all have the character of being beset irregularly all around with little prickles.

"The hinder peræopods have a finger which, so far as we are aware, is absolutely unique in structure: the propodus is cleft at the end to some depth, the cleft portions are rounded at the extremities and crenated or serrulated; the finger articulates at the base of the cleft, and is exactly spear-shaped, with serrated edges. A comparison of the fifth peræopod with the figures of the hinder peræopods of *Alaotanais serratispinosus* (the fourth peræopod) will at once give characters sufficient to distinguish these species.

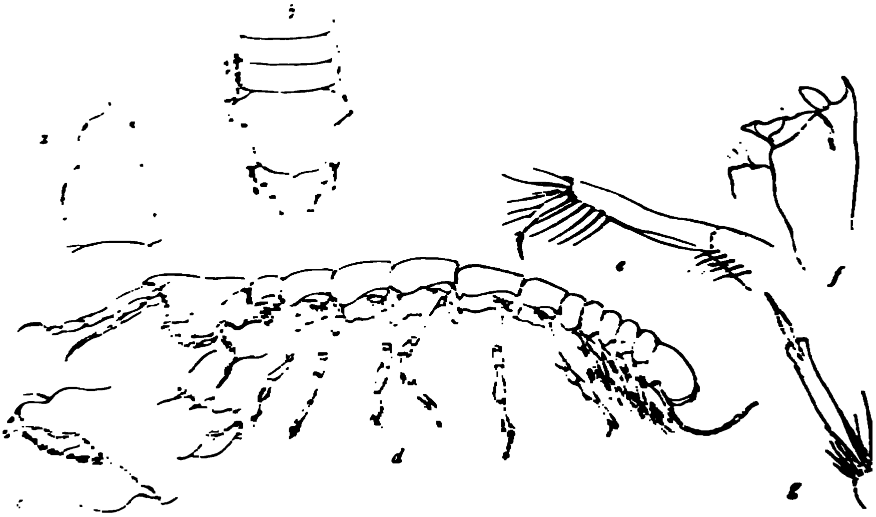

FIG. 22.—NEOTANAIS HASTIGER (AFTER NORMAN AND STEBBING). a, OUTLINE OF CARAPACE FROM ABOVE. b, ABDOMEN. c, THUMB AND FINGER OF FIRST GNATHOPOD. d, LATERAL VIEW. e, SECOND PEREIOPOD. f, PORTION OF CARAPACE SEEN FROM THE SIDE. g, LAST PEREIOPOD (TERMINAL JOINTS).

"The carapace, seen from above, is much narrower in front than behind, and has a short rostrum; the sides are very flexuous, and present two constrictions.

"The telson is shield-shaped; the upper corners of the shield (that is, the sides of the base of the telson) are very protuberant. Length, 5 millimeters." - NORMAN and STEBBING.[a]

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[a] Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, pp. 113-114.

Family II. APSEUDIDÆ.[a]

Body attenuated behind. First pair of antennæ with two unequal multiarticulate flagella. Second pair of antennæ usually furnished with a scale at the end of the second article of the peduncle. Mandibles with palp. Anterior maxillæ with two masticatory lobes. Posterior maxillæ well developed and setose. Epignath of maxillipeds large, laminar, branchial in character. Two anterior pairs of legs, usually provided at the base with minute, two-jointed exopods (exopodites). Second pair of legs fossorial in character. Uropoda double-branched; branches multiarticulate.

ANALYTICAL KEY TO THE GENERA OF APSEUDIDÆ.

a. Second pair of antennæ with a scale articulated to the end of the second article. Head and first thoracic segment coalesced.
  b. Exopods present on both pairs of gnathopods.
    c. Five pairs of pleopoda present, with branches uniarticulate. Abdomen composed of six segments ....Genus *Apseudes* Leach
    c′. Only four pairs of pleopoda present, with one of the branches two-jointed. Abdomen composed of six segments................Genus *Parapseudes* Sars
  b′. Exopods absent on both pairs of gnathopods. Five pairs of pleopods present, in which one of the branches is two-jointed. Eyes absent.
Genus *Typhlapseudes* Beddard
a′. Second pair of antennæ without a scale. Head and first two thoracic segments coalesced. Eyes absent...............Genus *Sphyrapus* Norman and Stebbing

8. Genus APSEUDES Leach.

Second antennæ with a scale articulated to the end of the second article. Exopods present on both pairs of gnathopods. Five pairs of pleopoda present, in which the branches are uniarticulate. First pair of legs in male larger than in female. First pair of antennæ usually alike in the two sexes.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS APSEUDES.

a. Head with rostrum short, produced to a mere point. Body without spiny armature. Flagellum of first antenna of same length as secondary filament.
Apseudes espinosus Moore
a′. Head with distinct rostrum. Body with spiny armature. Secondary appendage of first antenna shorter than flagellum.
  b. Basal article of peduncle of first antenna unarmed. Secondary appendage of first antenna one-fourth as long as flagellum. Long spiny processes on either side of head, one pair at the place of fusion of the first thoracic segment with the head, the other pair anterior to these, being the produced outer angles of the ocular lobes. Last segment of abdomen with posterior margin slightly emarginate, a small lobe being placed in the center of the emargination.
Apseudes gracilis Norman and Stebbing

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[a] See Sars, Crust. of Norway, II, 1899, p. 5, and Norman and Stebbing, Trans. Zool. Soc., London, XII, 1886, p. 79, for characters given below.

b'. Basal article of peduncle of first antenna armed with numerous spines. Secondary appendage of first antenna about one-half as long as flagellum. No spines at side of head at place of fusion of first segment of thorax with the head. Ocular spines small. Last segment of abdomen with the posterior margin triangularly produced.

c. Basal article of peduncle of first antenna armed with four spines on the inner lateral margin. Rostrum in form like a spear point, on either side of which is a small acute process within the ocular alæ. Last thoracic segment with a ventral spine. Lateral margins of five anterior segments of abdomen not produced in acute processes......*Apseudes triangulatus* Richardson

c'. Basal article of peduncle of first antenna armed with three spines on the inner lateral margin. Rostrum produced in a long, acute deflected process, on either side of which the lateral margin is expanded and evenly curved. All six segments of thorax armed with ventral spines. Lateral margins of five anterior segments of abdomen produced in acute processes.
Apseudes propinquus Richardson

APSEUDES ESPINOSUS Moore.

Apseudes espinosus MOORE, Bull. U. S. Fish Commission, XX, Pt. 2, 1902, pp. 164–165, pl. VII, figs. 1–6.

Locality.—Porto Rico, off St. Thomas.

Depth.—20 fathoms, in coral bottom.

"Cephalothorax short, less than length of first three segments of thorax, slightly wider than long; rostrum short, produced to a mere point; eyestalks short, projecting but slightly beyond sides of head. First three segments of thorax subequal to one another in length and breadth, approximately equal to head in breadth. Last three segments narrower; fourth segment longer than segments two and three combined; fifth free segment about equal to them; sixth segment about three-fourths as long as fifth. Epimera of first three segments not evident, none of the segments with lateral spines; epimera of last three segments small, in dorsal view projecting slightly from beneath each segment near its articulation with its successor. Abdomen narrower than last segment of thorax, but not abruptly so; the first five segments equal in length and successively slightly narrower; collectively about as long as sixth thoracic segment; lateral margins rounded, somewhat produced posteriorly. Telson about as broad as long, slightly narrower than fifth segment of pleon, bilobate posteriorly.

"Peduncle of antennule as long as head, first joint stout, longer than other three joints combined, second joint not half as long as first, two following joints successively shorter; two flagella of equal length, and longer than peduncle, the outer somewhat shorter, with seventeen joints, inner flagellum with fifteen joints.

"Antennæ about two-thirds as long as antennules; peduncle short, consisting of five joints, first and second joints stout, second furnished with a scale beset with long setæ, last three joints short. Flagellum about as long as flagella of antennule, consisting of thirteen setiferous joints.

"Mandibles stout, with a five-dentate cutting edge and a three-jointed palp. First maxillæ tipped with a number of brown spines. Maxillipeds with a stout four-jointed palp, of which the second joint is very large and stout. Details in relation to the oral parts are not known, as there was but one specimen mounted in balsam and not dissected.

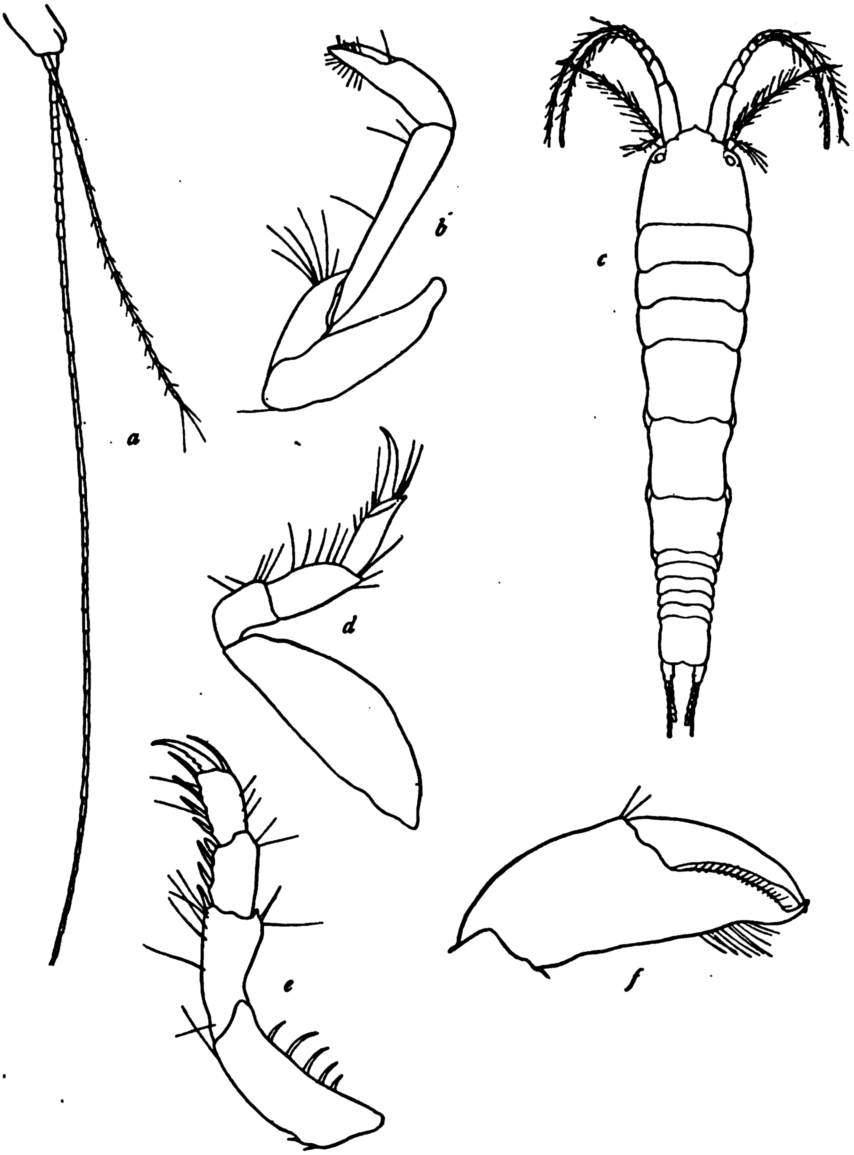

Fig. 34.—Apseudes espinosus (After Moore). *a*, Uropod. *b*, First leg. *c*, General figure. *d*, Seventh leg. *e*, Second leg. *f*, Chela. (All enlarged.)

"The chelipeds in the females are long and slender, the fifth joint being the longest and the second almost as long, but stouter. Th third joint is prolonged distally into a curved process furnished with five or six long hairs on the convex margin; the sixth joint, with the seventh, constituting a slender chela; no molar tubercles; curved margin of 'thumb' of sixth joint with a row of slender bristles; a row of blunt spines on cutting edge.

"The second pair of limbs have the joints stout and furnished with strong spines. The second joint or basis has five or six stout, curved spines on its outer margin. It is longer than the other joints. The terminal claw is flanked on each side by a strong spine attached to sixth joint. There appear to be but five free joints to this and the following limbs, but this appearance may be due to defects in the mounting; following pairs of limbs more slender, the last pair having a second joint almost as long as all the rest, and with an oblique row of small spines near distal end of posterior face of sixth joint.

"There are five pairs of pleopods with both branches one-jointed.

"Uropods biramous, the inner ramus with about fifty joints; outer ramus less than one-half as long, with about twenty-five joints. The joints of both are of irregular length.

"One specimen, female, from station 6079, 20 fathoms, 6 mm. by 1.4 mm."—MOORE.[a]

APSEUDES GRACILIS Norman and Stebbing.

Apseudes gracilis NORMAN and STEBBING, Trans. Zool. Soc., Lond., XII, 1886, Pt. 4, pp. 95–97, pl. XX.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–1888, p. 178.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 212; Proc. U. S. Nat. Mus., XXIII, 1901, p. 505.

Localities.—Davis Strait, latitude 59° 10′ north, longitude 50° 25′ west; also in the North Atlantic.

Depth.—1,750 fathoms.

"The carapace has the frontal margin produced into a long slender acute rostrum, which is half as long as the basal joint of the upper antennæ, and has a bulbous process on each side at its origin; ocular processes or alæ having their outer sides prolonged into an acute spine-like termination projecting forward and slightly outward. On each side of the carapace, at the junction of the first coalesced segment of the peræon with the cephalon, there is another pair of spinous processes closely assimilating in form to those of the alæ just described.

"The peræon has the segments remarkably long, more produced than in any other known species, especially the last four; each segment bears a pair of lateral acute spinous processes, and in front of these a pair of small tubercles, while on the ventral surface there is a large acute curved spine near the hinder margin, and near the front margin a small tubercle bearing two or three minute cilia. The epistoma is tumid, arched, carinate, and armed with a small spine near the mouth.

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[a] Bull. U. S. Fish Commission, XX, Pt. 2, 1902, pp. 164–165.

"The pleon is of great length, the five front segments subequal, and each as long as the first free segment of the peræon; epimera

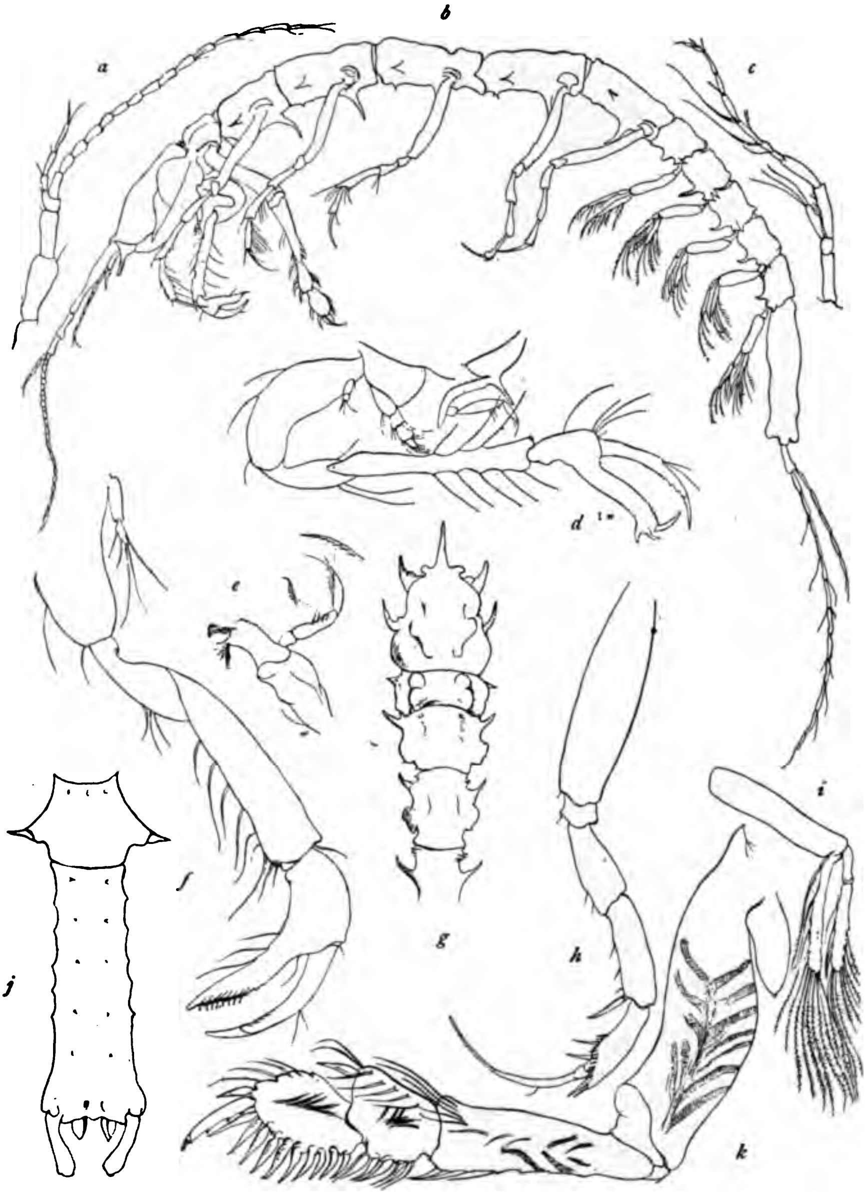

Fig. 35.—Apseudes gracilis (After Norman and Stebbing). *a*, Upper antenna. *b*, Lateral view. *c*, Lower antenna. *d*, Side view of mouth parts and an abnormally developed first gnathopod. *e*, Mandible. *f*, First gnathopod. *g*, Anterior part of body, from above. *h*, Fifth leg. *i*, Pleopod. *j*, Last segment of abdomen. *k*, Second gnathopod.

only slightly produced, terminating in small spines, a central ventral spine on each segment; last segment as long as the preceding thre having a number of minute tubercles about it; termination slight emarginate, with a small, rounded projection occupying the center of the emargination.

"Upper antennæ with the basal joint moderately stout, a tactile seta halfway up the outer margin; second and third joints subequal, their combined length scarcely more than half that of the first joint; filament consisting of about 17, secondary appendage of 4 articulations. Lower antennæ reaching to the end of the peduncle of the upper; the scale smaller than usual, only reaching to the middle of the fourth joint, and bearing only four setæ, two on the exterior margin and two apical, and none on the interior margin.

"The first gnathopods are slender and weak, and without much character; wrist very long, two and a half times as long as meros, with many cilia on the front margin; hand with the basal portion slender, and scarcely wider than the wrist; thumb and finger long, without any tubercular processes on the inner margin, the distal portion of that of the thumb bearing a series of microscopic flattened teeth, and short, stiff, obtusely ending cilia; finger having about five short stumpy spine-like teeth just before the unguis commences.

"Second gnathopods strongly built, basos naked; meros having the front margin ciliate, and bearing a distal spine, upper margin with a distal bunch of cilia; wrist unusually short, scarcely more than half the length of mèros, above with many cilia and a large distal spine, below with four cilia and two or three spines; hand widely ovate, rather longer than the wrist, upper margin with two spines and a few cilia; palm closely set all round with ten stout spines, but no cilia; all the spines of the limb are stout, but quite simple in character; finger strong, with four denticulations on the margin.

"Last peræopods slender, basos naked, the three succeeding joints having one or two minute cilia on the front margin, except that the carpus (which is slightly longer than the meros and hand, which are subequal to each other) has a long slender distal spine on the front; hand with a distal spine above and two slender spines on the palm, and passing obliquely across the last half of the joint, commencing beyond the middle of the palm and terminating at the upper margin of the origin of the finger, is a pectinated series of lancet-shaped spines, of which the margins are apparently simple. Finger of most unusual length, half as long again as the hand, the unguis especially being very greatly produced.

"Pleopods greatly developed, the peduncle long.

"Uropods with one branch consisting of about 7, the other of 18, articulations.

"The foregoing is a description of the females, one of which has incipient growths of the marsupial sac at the base of the second, third, fourth, and fifth peræopods.

"The males, which are known by the cylindro-columnar sexual organ situated between the last peræopods, where it takes the place of the ventral spine of the other sex, differ in having the lateral spines of the peræon-segments, and both epimeral and ventral spines of the pleon, so much reduced in size as to become almost obsolete, while the ventral spines of the earlier segments of the body are as large as in the female, and the hand of the first legs is not more largely developed than in the other sex. All these points are contrary to what is usual, and not what might have been expected to characterize the male. * * * Length half an inch."—NORMAN and STEBBING.[a]

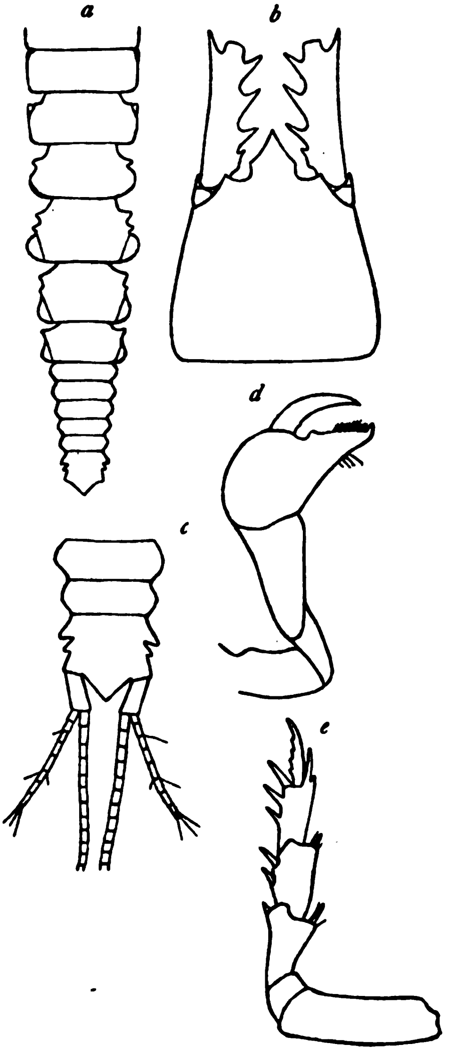

FIG. 36.—APSEUDES TRIANGULATUS. *a*, SEGMENTS OF THORAX AND ABDOMEN. *b*, HEAD. × 35. *c*, SEGMENTS OF ABDOMEN AND PART OF UROPODA. *d*, FIRST GNATHOPOD. *e*, SECOND GNATHOPOD.

APSEUDES TRIANGULATUS Richardson.

Apseudes triangulata RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 280–281, pl. XXXVII, figs. 1–5.

Locality.—Harrington Sound, Bermudas.

Body narrow, elongated, surface smooth.

Head with frontal margin produced at the middle in a rostrum like a spear point, the sides of which near the base are excavated below the lateral expansion of the rostrum. On either side of the excavation thus formed the margin is acutely produced in a small anterior process. Lateral to this process is the ocular process, which is produced anteriorly about the same distance. The eyes are distinct and black and occupy almost the whole surface of the ocular lobe.

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[a] Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, pp. 95–97

The first pair of antennæ have the first joint of the peduncle long, the inner lateral margin of which is armed with three long spines and one small one; the outer margin, with one large spine near the apex. The second joint is one-third the length of the first joint and is unarmed. The third joint is one-half as long as the second joint. The flagellum is composed of about fourteen joints; the secondary appendage of about seven joints. The peduncle of the second pair of antennæ extends to the end of the first joint of the peduncle of the first pair, and has an exopod developed at the base of the third joint. The flagellum is composed of about ten joints, and extends about half the length of the flagellum of the first pair of antennæ. There is a prominent spine on the epistome.

The first free segment of the thorax is shortest, the two following ones being longer, the next two the longest, and the last but little longer than the first. The first segment is as wide as the head, the others decrease in width gradually. The antero-lateral margins of all the segments except the first are produced into one acute process, of the fourth and fifth free segments into two acute processes. The last segment bears a ventral spine.

The abdominal segments gradually decrease in width backward. The sixth or terminal segment is produced on either side near the base into two acute processes. Beyond the last process the segment widens slightly for the attachment of the uropoda, and ends posteriorly in a triangular process. The uropoda are very long, the inner branch being half the length of the body, and composed of about twenty-five joints. The outer branch is composed of seven joints.

First gnathopods with the upper distal margin of the propodus, finely serrate and armed with a tooth near the articulation of the dactylus. Second gnathopods have the merus armed with one spine at the distal extremity on the posteri or margin, and one on the anterior margin; the carpus armed with two spines on the posterior and one on the anterior margin at the distal extremity; the margin of the propodus armed with three spines on the posterior margin, and one large spine and one small one at the distal extremity on the anterior margin. The dactylus is serrate on the inner margin. Exopods are present on both first and second gnathopods. The other legs are beset with spines.

The specimen is a female and has a large marsupium filled with eggs, extending the length of the first four free segments of the thorax.

Only one individual was collected by Prof. A. E. Verrill and party, in Harrington Sound, Bermudas.

Type specimen in Peabody Museum, Yale University. Cat. No. 3192.

APSEUDES PROPINQUUS Richardson.

Apseudes propinquus RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 281–283, pl. XXXVII, figs. 6–9.

Localities.—Bailey Bay and Castle Harbor, Bermudas; Gulf of Mexico.

Found on surface.

Body narrow, elongated, surface smooth.

Head with frontal margin produced in the middle in a long, acute, deflected process, from base of which on both sides there is an abrupt lateral expansion, the margin forming an outward curve which extends to the base of the ocular lobe and then proceeds straight to the lateral margin of the head. Ocular lobe produced in an acute process. Eyes large, black, occupying the whole of the ocular lobe.

First pair of antennæ with first joint of peduncle long, and armed on the inner lateral margin with two large spines and one small one near the base, and on distal end of outer margin with one large spine. Second joint less than one-third the length of first joint and unarmed. Third joint one-half as long as second joint. Flagellum composed of sixteen joints. Secondary appendage composed of eight joints. Second pair of antennæ with an exopod at base of third joint of peduncle; flagellum composed of ten joints. There is a conspicuous spine on the epistome.

First two free segments of the thorax about equal in length, the three following ones longer, increasing in length, the last segment a little longer than the first two. The antero-lateral margins of all the segments are acutely produced, those of the fourth and fifth free segments have two antero-lateral angulations. There is an anteriorly directed curved spine on the ventral surface of the first free segment. On the ventral surface of the second segment there is a straight spine directed posteriorly. The third, fourth, and fifth segments bear each a ventral curved spine directed anteriorly. The sixth segment has on the ventral surface a large, stout process.

The lateral margins of all the first five abdominal segments are drawn out in acute processes.

The terminal segment has two lateral angulations above the attachment of the uropoda. The posterior margin is triangulate. The inner branch of the uropoda is very long, equal in length to half the body, and is composed of thirty-four joints. The outer branch consists of eleven joints.

The first gnathopods have a tooth on the distal margin of the propodus near the articulation of the dactylus. There is a conspicuous spine on the posterior margin of the basis.

The second gnathopods have one spine at the distal end of the m
on the anterior margin; one spine at the distal end of the carpu
the anterior margin, and two spines on the posterior margin of

same joint; four spines on the posterior margin of the propodus and two on the anterior margin at the distal extremity; the dactylus is serrate along the inner margin. Exopods are present on both first and second gnathopods. The other legs are beset with spines.

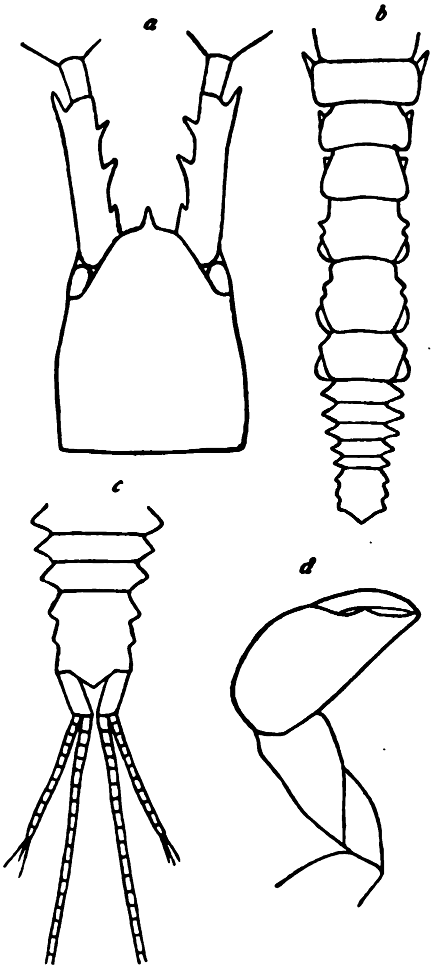

FIG. 37.—APSEUDES PROPINQUUS. *a*, HEAD. *b*, SEGMENTS OF THORAX AND ABDOMEN. *c*, LAST FOUR SEGMENTS OF BODY AND PART OF UROPODA. *d*, FIRST GNATHOPOD.

A few specimens, both males and females, were collected by Prof. A. E. Verrill and party at Bailey Bay and Castle Harbor, Bermudas, in 1898.

Type specimen from the Bermudas is in the Peabody Museum, Yale University. Cat. No. 3194.

This species is very closely related to *Apseudes intermedius* Hansen[a] but differs in the following points:

1. The first joint of the peduncle of the first pair of antennæ is armed with three spines on the inner margin, and one spine on the outer margin at the distal end. In *A. intermedius* this joint is unarmed.

2. In the increased number of joints in the flagella of both pairs of antennæ, there being sixteen joints in the flagellum of the first pair of antennæ, eight in the secondary appendage, and ten in the flagellum of the second pair of antennæ, while in Doctor Hansen's species the flagellum of the first pair of antennæ is composed of seven joints, the secondary appendage of three joints, and the flagellum of the second pair of antennæ of four joints.

3. In the much greater length of the uropoda, the inner branch of which in *A. propinquus* is half the length of the body and composed of thirty-four joints, the outer branch consisting of eleven joints,

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[a] Isopoden, Cumaceen, und Stomatopoden der Plankton-Expedition, 1895, p. 49–50, pl. v. fig. 10–10b; pl. vi, fig. 1.

while in *A. intermedius* the outer branch has only four joints, and the inner branch is only twice the length of the terminal abdominal segment and is composed of only fifteen joints.

9. Genus PARAPSEUDES Sars.

Exopods present on both pairs of gnathopods. Only four pairs of pleopoda present, with one of the branches two-jointed. Second pair of antennæ with a scale articulated to the end of the second article.

PARAPSEUDES GOODEI Richardson.

Parapseudes goodei Richardson, Trans. Conn. Acad. Sciences, XI, 1902, pp. 283-284, pl. xxxvii, figs. 10-14.

Locality.—Castle Harbor, Bermudas.

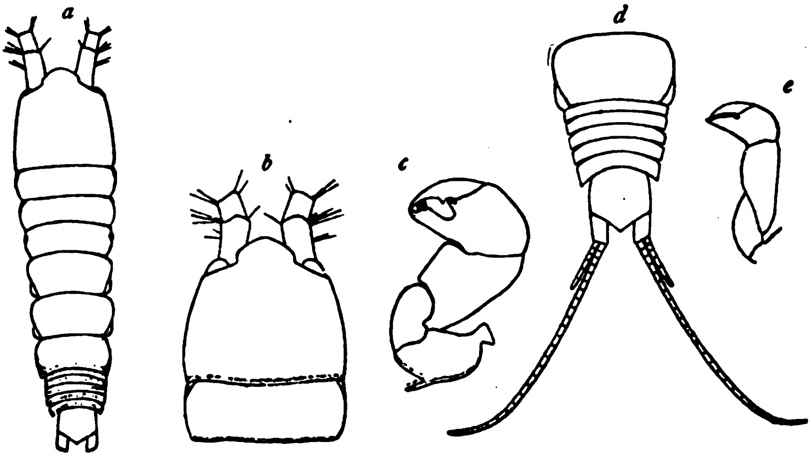

Fig. 38.—Parapseudes goodei. *a*, General figure. *b*, Head and first thoracic segment. *c*, First gnathopod of male. *d*, Abdomen with uropods and last thoracic segment. *e*, First gnathopod of female

Surface of body smooth; color light yellow.

Head but slightly narrowed anteriorly. Eyes with large, brown ocelli and placed on ocular processes, articulated to the head. Frontal margin with a rostrum projecting between the basal joints of the first pair of antennæ. The base of the rostrum is constricted, the anterior margin broadly rounded.

The first pair of antennæ have the peduncle short, the first joint twice as long as the second; the third half as long as the second; all three with margins smooth, unarmed, but fringed with long hairs. The flagellum consists of seven joints; the secondary appendage of four joints. The second pair of antennæ extend only to the end of the peduncle of the first pair; the flagellum consists of five joints; scale is articulated to the peduncle.

The first, second, and third free thoracic segments are about equal in length, the following three being longer than the first three, and subequal. The first and second segments have a small epimeral lobe on the antero-lateral margin. The third segment has a small lobe about the center of the lateral margin. The lobes of the three following segments are situated post-laterally.

The abdomen is very short; all the segments together not equaling in length the last two thoracic segments. The first five segments have the margins produced at the sides, with deep lateral incisions between the segments.

The terminal segment is triangulate posteriorly with the apex acute. The uropoda are quite half the length of the body, the inner branch consisting of about twenty-five joints, the outer and smaller branch consisting of six joints. There are but four pairs of pleopoda.

The first pair of legs in the female are much more slender than those of the male. In the male there is a deep excavation on the distal margin of the propodus near the articulation of the dactylus, while in the female this excavation is comparatively small. In the male there is a spine within this excavation and one on the dactylus, both situated at the articulation of the dactylus and the propodus. Exopods are present on both pairs of gnathopods. All the other legs are very spinulose.

A few specimens (types) were collected by Prof. A. E. Verrill and party in 1898, at Castle Harbor, Bermudas, and one specimen was collected by Dr. G. Brown Goode at the Bermudas in 1876–77.

Type in Peabody Museum, Yale University. Cat. No. 3222.

Named in honor of the late Dr. G. Brown Goode.

This species has a close resemblance to *Parapseudes latifrons* (Grübe),[a] but differs in the following characters: in *P. goodei* the first pair of gnathopods are more robust; the propodus has a deep excavation near the articulation of the dactylus, within which is a large spine. There is also a spine on the dactylus.

The rostrum is constricted at the base in *P. goodei*, while in *P. latifrons* the line is unbroken from the apex of the rostrum to the lateral margin of the head.

The secondary appendage of the flagellum of the first antennæ is composed of four joints in *P. goodei* while in *P. latifrons* this appendage is composed of seven joints. The flagellum of the second pair of antennæ consists of five joints in *P. goodei*, while in Grübe's species it consists of eight joints.

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[a] *Rhoëa latifrons* Grübe, Die Insel Lussin und ihre Meeresfauna, 1864, p. 75.

Parapseudes latifrons G. O. Sars, Archiv for Math. og Naturvidenskab, XI, 1886, p. 304, pl. VIII.

10. Genus TYPHLAPSEUDES Beddard.[a]

Eyes absent. No exopodite present on the first two pairs of thoracic appendages. All five pairs of pleopoda present. Abdomen composed of six distinct segments. Antennæ with a rudimentary exopodite, consisting of a single long joint. Pleopoda well developed, the exopodite bi-articulate.

TYPHLAPSEUDES NEREUS Beddard.

Typhlapseudes nereus BEDDARD, Proc. Zool. Soc. Lond., 1886, Pt. 1, p. 115; Report on the Scientific Results of the Expl. Voyage of H. M. S. *Challenger*, Zool., XVII, 1886, pp. 112-113.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 505.

Locality.—Off Sombrero Island.

Depth.—450 fathoms.

"This species is represented by a number of individuals dredged in the North Atlantic from a depth of 450 fathoms. The average length of the species is about 10 mm. The body is flattened and depressed, smooth, without any covering of hairs even on the abdomen; it is wider anteriorly and gradually narrows to the posterior extremity.

"The head and the first segment of the thorax, which are of course fused together and form a cephalic shield, is flattened in front, but convex laterally and behind. The frontal margin projects as a short, sharp rostrum; behind the insertion of the antennary organs is a triangular ocular lobe pointed in front; it has no trace of any optic structures; behind this again is another shorter, triangular, pointed process; more posteriorly the lateral margins of the cephalic shield are convex outward.

"The free thoracic segments diminish gradually in breadth, but increase in length up to the fifth; the sixth is not only narrower, but shorter than the fifth. They are all furnished with very minute epimera, those of the first segment are larger, and project anteriorly in the form of a short spine. The lateral margins of all but the first two segments are furnished with a short spine, very broad at its base, which is situated about halfway between the articulation of the limbs and the anterior margin of the segment. In the sixth (and last) segment of the thorax this spine is almost obsolete. In the ventral surface of the thoracic segments is a median spine.

"In the female the first four of the free thoracic segments have ovigerous lamellæ. Of the abdominal segments the first pair are subequal, but diminish gradually in breadth; they are furnished with small epimera, terminating in a pointed extremity and directed backward.

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[a] See Beddard for characters of genus. Challenger Report, XVII, 1886, pp. 111-112.

"The terminal segment of the abdomen equals in length any four of the anterior abdominal segments; it is cylindrical in form, becoming gradually wider toward the extremity; it terminates in a truncated straight posterior margin, and in the middle line in a short oval prolongation.

"The antennules are stouter, as well as longer, than the antennæ; they are about as long as the cephalothoracic shield and the first segment of the thorax taken together. The basal joint is long and stout, the second joint is very much shorter, the third and fourth shorter still; from the last joint of the peduncle arise the two flagella, of which the outer is longer as well as stouter than the inner; the outer flagellum is made up of ten joints, of which the first is very much the longest; it diminishes gradually in width toward the extremity; the inner flagellum has four or five narrow elongated joints.

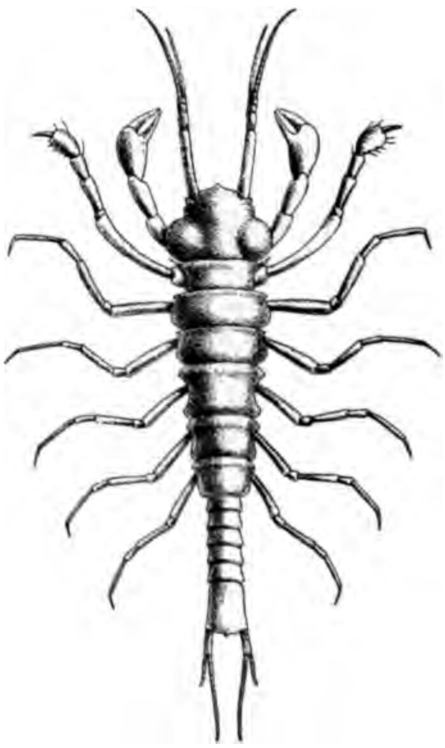
FIG. 39.—TYPHLAPSEUDES NEREUS (AFTER BEDDARD).

"The antennæ have a five-jointed peduncle and a flagellum about as long as the last two joints. The first joint of the peduncle is short, the second long, with a short, cylindrical, setose exopodite articulated at its extremity; the third joint is very short, the fourth and fifth long and subequal.

"I have not had a sufficient amount of material at my disposal to give an accurate account of the mouth appendages.

"The chelæ are not remarkable in any way except for the absence of an exopodite; they appear to be perfectly similar in both sexes, and agree very closely with those of the genus *Sphyrapus* (female), etc. The first joint is very much stouter than any of the succeeding joints; the second is short and narrow and bears a spine on the inner side just before its articulation with the next joint, which is extremely minute and might easily be overlooked; it is wedged in between the second and third joints, and is only apparent on the inner side of the limb. The fourth joint is longer and stouter and has a number of hairs along the inner margin. The two fingers cross at their extremity; they are serrate along the margins which come in contact.

"The fossorial limbs, which form the second pair, are much longer and stouter than the succeeding abdominal limbs. The first joint is long and curved, the second is very minute, the third and fourth are subequal and rather less than one-half of the length of the basal joint; the first two joints have no spines, the third has a single strong spine on the inner margin just before it articulates with the succeeding joint, and a tuft of hairs on the corresponding opposite side; the fourth joint has two strong spines on the inner and a single spine on the outer side, besides hairs and more slender spines; the fifth is shorter than either of the preceding, its inner margin is fringed with five stout spines, increasing in length toward the extremity of the joint, and two strong spines besides more slender ones on the outer side; the terminal joint of the limb is elongated and claw-like, toothed along the inner margin. These appendages like the preceding have no exopodite, and they do not differ in the two sexes to any appreciable extent.

"The succeeding thoracic appendages are similar to each other and very much more slender than the preceding limbs; the proportionate length of the joints is, however, the same, the second being, as in the fossorial limbs, extremely minute. The spines with which the terminal joints of these limbs are ornamented are also more slender than those of the second pair of thoracic appendages.

"The abdominal appendages, with the exception of the uropoda, are similar to each other; all the five pairs consist of an elongated basal joint and of two subequal, rather shorter setose rami; the exopodite is divided by a suture into two joints.

"The uropoda are short and biramose, with an elongated basal joint and two rami, the outer is the shorter.

"Station 23, off Sombrero Island, March 15, 1873; latitude, 18° 24′ north, longitude, 63° 28′ west; depth, 450 fathoms; Pteropod ooze."—BEDDARD.[a]

11. Genus SPHYRAPUS Norman and Stebbing.[b]

First two segments of thorax fused with the head to form a carapace. Eyes absent. Second pair of antennæ without scale. Exopods present on first two pairs of legs. Gnathopods in male with carpus and merus much more elongated than in female. Second pair of legs in male of extraordinary length. Pleopoda well developed, with both branches bi-articulate. Flagellum of first antennæ in male with dense bunches of sensory hairs.

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[a] Challenger Report, XVII, 1886, pp. 112–113.

[b] See Sars' Crustacea of Norway, II, 1899, pp. 8–9, and Norman and Stebbing, Trans. Zool. Soc. London, XII, 1886, p. 97, for characters of genus. Sars says that only the first thoracic segment is fused with the head.

SPHYRAPUS MALLEOLUS Norman and Stebbing.

Sphyrapus malleolus Norman and Stebbing, Trans. Zool. Soc. London, XII, 1886, pp. 98–99, pl. xxii, figs. 2–3.—Bonnier, Ann. de l'Univers. de Lyons, XXVI, 1896, p. 665, pl. xxxi, fig. 1.—Richardson, American Naturalist, XXXIV, 1900, p. 212; Proc. U. S. Nat. Mus., XXIII, 1901, p. 505.

Localities.—South of Cape Farewell, Greenland; also latitude 39° 39′ north, longitude 9° 39′ west, off coast of Portugal; latitude 45° 57′ north, longitude 6° 21′ west; latitude 44° 36′ north, longitude 4° 25′ west; south of Rockall; Bay of Biscay; Bay of Gascony; latitude 57° 11′ north, longitude 37° 41′ west.

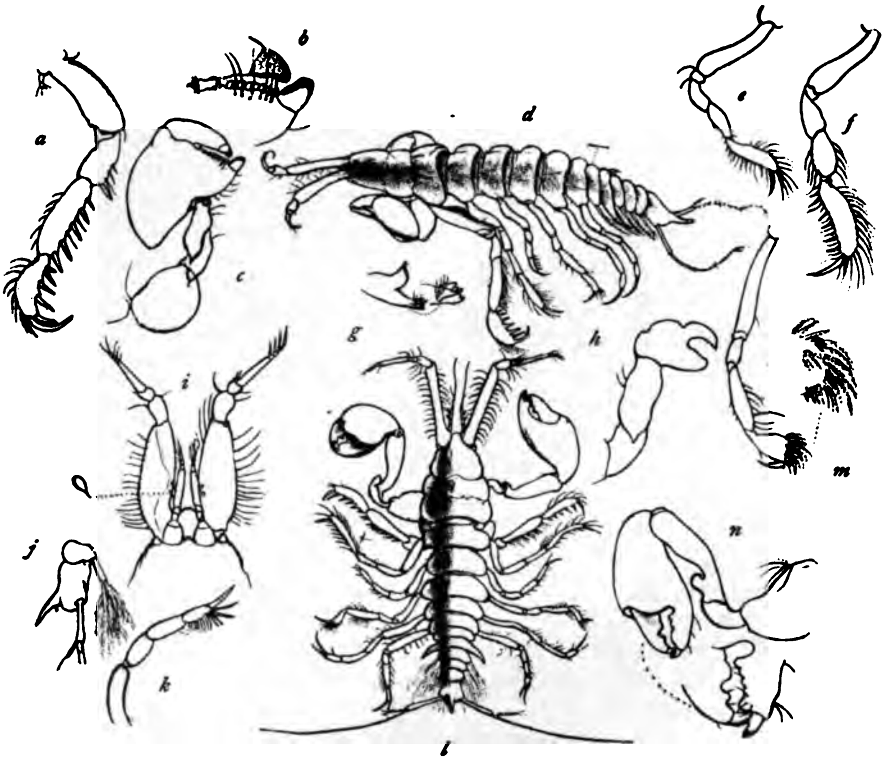

Fig. 40.—Sphyrapus malleolus (After Norman and Stebbing). *a*, Second leg or gnathopod. *b*, First leg or gnathopod. *c*, First leg. *d*, Male, seen obliquely from above. *e*, Fourth leg or second peræopod. *f*, Third leg or first peræopod. *g*, Mandible. *h*, First leg or gnathopod of female. *i*, Antennæ, seen from below. *j*, Terminal segment of abdomen with pleopod and base of uropods, seen from the side. *k*, Seventh leg or fifth peræopod. *l*, Female, seen from above. *m*, Fifth leg or third peræopod. *n*, First leg or gnathopod of female.

Depth.—1,450 fathoms; 1,410 meters and 650 meters; 740 fathoms.

"Rostrum short and obtusely pointed. Ophthalmic processes minute, shaped like a baker's cap, and more easily seen from below than from above. The confluent segments are both wider than the head, and the second wider than the first; to the rear of these the animal tapers irregularly, the center peræon-segment being narrower than its neighbor, as is also the case in *S. tudes*, and the pleon tapers more suddenly than the peræon as far as the base of the sixth segment, the sides of which diverge to the point of insertion of the uropods and then suddenly converge to a central and somewhat upturned, much produced, apical process. Of the peræon-segments the last two are the shortest. The first five segments of the pleon are nearly equal in length to one another; only the second has lateral spine-like processes, but here they are large, produced, and very conspicuous.

"The upper antennæ have the basal joint large, in the male stout, shorter than the cephalic plate, in the female dilated at the base, longer than the cephalic plate, in both ciliated on the margins; the second joint is short, dilated distally; the third is about half the length and breadth of the second; the flagellum consists of one long, succeeded by four short, articulations; the secondary appendage is rudimentary and represented by only one minute articulation. The lower antennæ have the basal joint as broad as it is long, the three following joints short, the fifth long and slender, carrying on the outer side two pear-shaped vesicles; the flagellum is three jointed, the second and third joints furnished with long cilia.

"The first gnathopods have the soldered coxal portion folded beneath; the basos broad and short, the ischium wanting; the meros narrow at the base, then dilated, and ending in a point; the carpus in the male is a little longer than the meros, which it overlaps; it is pointed distally, its sinuous margins are nearly parallel; upon it the huge hand is set hammer-wise. In shape the hand is roughly triangular; a line from the base of the finger to the stout horny thumb may be considered the base of the triangle; along this (palm) margin is set a row of flat little teeth, all but one or two of them lying closely side by side; one of the sides of the triangle runs from the thumb-nail backward, receiving the wrist in a sinuosity about the middle; the remaining side is formed by the curved line running from the hinder extremity of the last-described side to the base of the finger; the finger, which is short and stumpy, with a nail like the thumb-nail, doubles closely down upon the palm. In the female the wrist is considerably longer than in the male, and is of the same breadth at both ends, but has a narrow neck near its base; the hand in this sex is attached to the wrist by the apex of the triangle; the thumb is a long process projecting from the base of the triangle and causing the finger to project in like manner, and the hand is thus of very different form from that of the male, being ovate; the inner margins of both thumb and finger are irregular; the thumb is truncate and has the horny nail set close to the outer margin; the nail of the finger closes down into the cavity within the thumb-nail and on the truncated end of the thumb.

"The second gnathopods resemble those of *Sphyrapus tudes*, but the basos is narrower, being only slightly broader than the following joints; the meros has one distal spine on the front margin, the wrist a row of five spines, and the hand the same number; the finger is much curved, slender, and its margin smooth.

"In the first peræopods the wrist is a little dilated, the hand flat, long, curved, with seven slight spines on the front margin and much ciliated on both margins.

"The second peræopods are shorter than any except the last; the third have the hand short, distally dilated, and then surrounded by a fence of biserrate spines of varying lengths. The fourth and fifth pairs are similar in form, but the fifth is smaller than the fourth; the wrist is longer than the hand, which is small, ciliated, and has two long spines near the base of the finger.

"The uropods have the peduncle as long as the segment, minus its produced apex, and a little dilated distally; the inner branch is long, with about 15 articulations, which vary irregularly in length; the outer branch is very slight and composed of 3 articulations. Judging from the spirit-preserved specimens the uropods in this species would seem to be carried divergently, not following behind parallel to each other.

"*Sphyrapus malleolus* may at once be distinguished from its allies, not only by the form of the gnathopods, but by the rudimentary condition of the inner flagellum of the upper antennæ, which is reduced to an unjointed minute tubercle and by the spine-formed wings of the second segment of the pleon." —NORMAN and STEBBING.[a]

II. CYMOTHOIDEA or FLABELLIFERA.

Legs of the first pair not cheliform. Uropoda lateral and forming with the last segment of the abdomen a caudal fan. Pleopoda for the most part natatory.

ANALYTICAL KEY TO THE FAMILIES OF THE CYMOTHOIDEA OR FLABELLIFERA.

a. Legs in the adult in six, apparently only in five pairs....Family III. GNATHIIDÆ
 aa. Legs in the adult usually in seven pairs.
  b. Uropoda lateral and superior, outer branch arching over base of telson. Body subcylindrical, narrow, elongated....................Family IV. ANTHURIDÆ
  bb. Uropoda lateral.
   c. Abdomen usually composed of six segments.
    d. Uropoda with both branches well developed, mostly lamelliform.
     e. Maxillipeds with the palp free, the margins of the last two articles more or less setose, never furnished with hooks.

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[a] Trans. Zool. Soc. Lond., XII, 1886, p. [illegible]

Hansen's analytical key as [illegible] Stebbing has been inserted between [illegible] See Hansen, Vidensk. Selsk. Skr., [illegible] naturv. og Math. Afd. V, [illegible] and Stebbing, Hist. of Crust., [illegible] *f.* Mandibles with the distal half stout, very conspicuous, or with only the anterior margin concealed; from the base toward the middle directed forward and a little outward.

g. Mandibles with the rather broad, more or less tridentate, cutting edges meeting squarely behind the large upper lip; the secondary plate and peculiar equivalent for the molar well developed. First maxillæ having the plate of the first joint armed with three spines, that of the third with many. Second maxillæ of moderate size, the three free plates very setose. Maxillipeds with the palp rather broad, very setose........................Family V. CIROLANIDÆ

g'. Mandibles with the distal part produced into a long prominent process, the pair much overlapping; the secondary plate and molar evanescent. First maxillæ having the plate of the first joint unarmed, of the third carrying one very long spine. Second maxillæ bifid, small and feeble, the free plates almost rudimentary, with few setæ. Maxillipeds with the palp narrowed, the antepenultimate joint elongate.....Family VI. EXOCORALLANIDÆ

f'. Mandibles with the distal half narrow, most or all of it concealed by the upper and lower lips; from the base toward the apex gradually directed inward. Mandibles usually without molar process. Apex of second maxillæ simple. Antepenultimate joint of maxillipeds not elongate..............................Family VII. CORALLANIDÆ 156

e'. Maxillipeds with the palp embracing the cone formed by the distal parts of the mouth organs, the inner upper margin and apex never setose, the apex and sometimes the inner upper margin, at least in the males and females without eggs, being furnished with outward curved hooks.

f. Antennæ of both pairs with well-defined peduncle and flagellum. Mandibles with the secondary plate very often visible; palp with no inflated joint. Maxillipeds with the palp commonly composed of five articles, sometimes composed of two articles, the last article in the latter case rather short, obtuse ....Family VIII. ÆGIDÆ

f'. Antennæ much reduced, without clear distinction between peduncle and flagellum. Mandibles with no secondary plate; palp in adults with first joint or both first and second joints inflated. Maxillipeds always with palp composed of two joints, last joint rather long and narrow, subacute ....Family IX. CYMOTHOIDÆ

d'. Uropoda with one of the branches almost obsolete or rudimentary—not lamelliform ....Family X. LIMNORIIDÆ

c'. Abdomen composed of less than six segments.

d. Abdomen composed of two segments. Uropoda with one branch fixed, immovable ....Family XI. SPHÆROMIDÆ 270

d'. Abdomen composed of four segments. Uropoda with both branches movable.......................................Family XII. SEROLIDÆ 320

Family III. GNATHIIDÆ.[a]

Thorax with only five pairs of normal walking legs in the adult. Last pair of legs wanting. First pair of legs modified; in male they are valve-like, arching over the ventral side of the head; in the female they are smaller and more distinctly segmented; in the larval form

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[a] See Sars's Crustacea of Norway, II, 1899, p. 50, and Harger, Report U. S. Comm. of Fish and Fisheries, 1880, Pt. 6, pp. 408–410, for characters given below.

they terminate in a strong hook. Head of adult male armed with powerful forward-projecting curved jaws or mandibles. First segment of thorax is united with the head, but separated by a suture line. Seventh thoracic segment small, resembling those of abdomen. Abdomen abruptly narrower than thorax and composed of six segments. Mandibles wanting in female. No true incubatory pouch present. Oral parts in female reduced to maxillipeds only; in male to mandibles and maxillipeds. Sexes very different in appearance. Body of male depressed and dilated in front; that of female more or less fusiform. Larval form also different, but resembling female.

12. Genus GNATHIA Leach.[a]

Head of male large, subquadrangular. Head of female rather small, subtriangular. Thorax composed of five well-developed segments, the other two segments being rudimentary, the first being fused with the head and the seventh placed between the projecting lateral parts of the fifth segment. First pair of legs in male operculiform, composed of two articles; those of female subpediform, being divided into three or four articles. There are five pairs of ambulatory legs. Abdomen much narrower than the thorax. Mandibles present in male, more or less flattened and projecting anteriorly beyond the head. Maxillipeds without epignath; palp composed of four articles.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS GNATHIA.

a. Mandibles in male with the basal part ornamented on the superior margin with an elevated crest, which is irregularly dentate. Legs furnished with many spiny processes.................................. *Gnathia cristata* (Hansen)

a′. Mandibles in male without elevated crest on the superior margin. Legs without spiny processes.

  b. Mandibles in male with slight notch outside, inner edge obtusely produced in the middle, tip acute, slightly incurved. Front of head not produced in the middle beyond the antero-lateral angles.......... *Gnathia elongata* (Krøyer)

  b′. Mandibles in male carinate on outer side near the middle, the carina ending in a tooth-like process, irregularly and bluntly toothed near the base within, turned upward at apex. Front of head produced in the middle much beyond the antero-lateral angles............................ *Gnathia cerina* (Stimpson)

GNATHIA CRISTATA (Hansen).

Anceus cristatus HANSEN, Vidensk. Meddel. Naturh. Foren. i. Kjøbh., 1887-1888, p. 182, pl. VII, fig. 2-2a.

Gnathia cristata RICHARDSON, American Naturalist, XXXIV, 1900, p. 214; Proc. U. S. Nat. Mus., XXIII, 1901, p. 506.

Locality.—Latitude 72° 32′ north, longitude 58° 51′ west.

Depth.—116 fathoms.

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[a] See Sars's Crustacea of Norway, II, 1899, p. 50, and Harger, Report U. S. Comm. of Fish and Fisheries, 1880, Pt. 6, pp. 408-410, for characters given below.

Description of male.—This species is closely related to *Gnathia hirsuta* (Sars), but differs from all other species of the genus in the structure of the mandibles.

The body is very short; the thorax is a little narrower than long in the median line. The fourth free segment of the thorax (fifth segment) is scarcely longer than the fifth segment. The fifth free segment (sixth segment) has large lateral areas, posteriorly very much elongated, with the posterior angles subrotund.

The abdomen in the specimen is almost entirely wanting.

The head and the first two free segments of the body are very rough and ornamented with acute processes and numerous tubercles; the third free segment (fourth segment) is ornamented with smaller tubercles at the anterior portion, but is smooth posteriorly; the fourth free segment (fifth segment) has large swollen lateral areas, ornamented with a few tubercles, the median part being smooth; the fifth free segment (sixth segment) is smooth. The eyes are rather large, manifest. The mandibles are large, ornamented on the basal half of the superior margin with a very high crest irregularly notched or dentated. The teeth of the crest have the apex rounded.

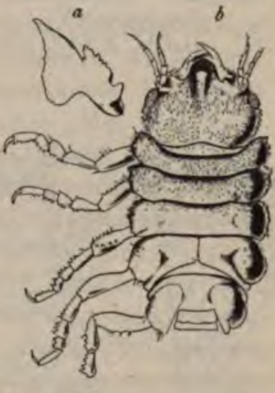

FIG. 41.—GNATHIA CRISTATA (AFTER HANSEN). *a*, RIGHT MANDIBLE (INNER SIDE). *b*, MALE (SOMEWHAT MUTILATED) (ENLARGED.)

The legs are long, rather robust, furnished with many processes, for the most part, large. The body and the legs are furnished with a few hairs. Length of the head and thorax together 3.1 mm.

Only a single mutilated specimen.[a]

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[a] The above description is adapted from the following description of Hansen's:

Specimen singulum masculinum sat mutilatum vidi.—*Anceo hirsuto* G. O. Sars sat affinis, structura mandibularum a speciebus omnibus mihi cognitis diversus. Corpus brevius; truncus paulo augustior quam in linea media longior. Segmentum quartum liberum trunci segmento quinto vix longius; segmentum quintum areis lateralibus magnis, post valde elongatis, angulis posterioribus subrotundatis. (Cauda in specimine fere tota deest.) Caput et segmenta duo anteriora libera trunci scabra, processulis acutis et tuberculis permultis ornata; segmentum tertium liberum ante tuberculis minoribus instructum, postice glabrum; segmentum quartum area laterali magna, inflata, tuberculis nonnullis decorata, parte media glabra; segmentum quintum glabrum. Oculi sat magni, dilutiores. Mandibulæ magnæ, parte dimidia basali marginis superioris crista valde elevata et irregulariter inciso-dentata ornata; dentes cristæ apice rotundato. Pedes longi, sat robusti, processulis multis, ex parte magnis, muniti. Corpus pedesque setis nonnullis instructa.—Long. capitis et trunci juncti 3, 1 mm.—HANSEN, Vidensk. Meddel. Naturh. Foren. i Kjøbh., 1887–88, p. 182.

GNATHIA ELONGATA (Krøyer).

Anceus elongatus Krøyer, Voy. en Scand., Crust., 1849, pl. xxx, fig. 3a–g; Naturh. Tidsskr. (2), II, 1846–49, pp. 388–394.—Hansen, Dijmphna-Togtets Zool.-bot. Udbytte, 1887, p. 205; Vidensk. Meddel. Naturh. Foren. i Kjøbh., 1887–88, p. 182.

Gnathia elongata G. O. Sars, Crust. of Norway, II, Isopoda, 1899, p. 55, pl. xxiii, fig. 1.—Richardson, American Naturalist, XXXIV, 1900, p. 214; Proc. U. S. Nat. Mus., XXIII, 1901, p. 507.—Axel Ohlin, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. iv, No. 12, 1901, pp. 20–21.

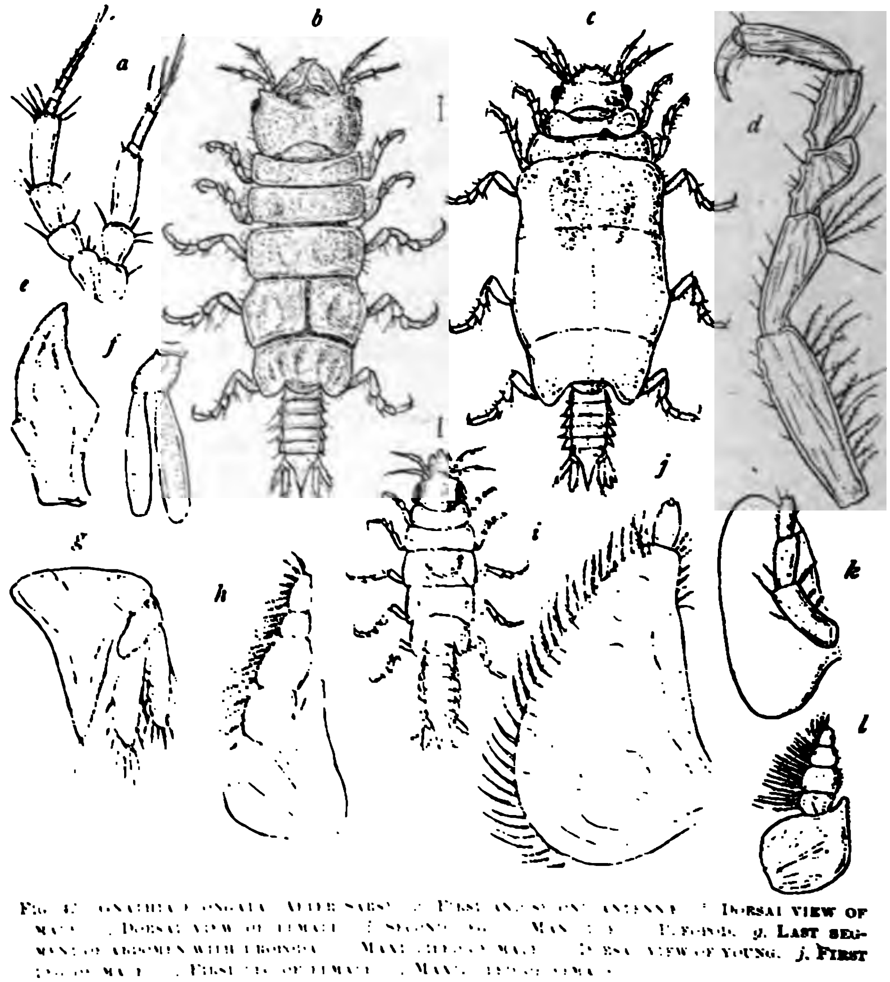

FIG. [illegible].—GNATHIA ELONGATA (AFTER SARS). a. FIRST AND SECOND ANTENNÆ. b. DORSAL VIEW OF MALE. c. DORSAL VIEW OF FEMALE. d. SECOND [illegible]. e. MAN[illegible]. f. [illegible]. g. LAST SEGMENT OF ABDOMEN WITH UROPODS. h. [illegible] OF MALE. i. DORSAL VIEW OF YOUNG. j. FIRST [illegible] OF MALE. k. FIRST [illegible] OF FEMALE. l. [illegible] OF FEMALE.

Localities.—West Greenland; also coast of Finmark; Lofoten Islands; Kara Sea; King Charles Island; Bremer Sound; latitude 78° 50′ north, longitude 29° 39′ east, King Charles Island (Ohlin).

Depth.—49–55 fathoms (Hansen); 60–110 m. (Ohlin).

Found in soft clay with great stones; soft, black-grayish clay.

"Male: Body rather elongated, with the mesosome of nearly uniform breadth throughout, and the median constriction not very much pronounced. Cephalosome of moderate size, rounded quadrangular, with the supraocular processes well defined. Dorsal face of both cephalosome and mesosome very uneven, with irregular depressions, and clothed all over with minute spinules and short hairs. Penultimate pedigerous segment divided dorsally by a narrow longitudinal groove into two halves. Metasome comparatively narrow, and scarcely longer than the two posterior pedigerous segments combined; epimera small. Eyes well developed, though not very large. Mandibles comparatively small, with only a very slight notch outside; inner edge obtusely produced in the middle, tip acute, slightly incurved. Perioppoda with small tubercles inside the outer joints. Terminal segment of metasome considerably narrowed in its outer part, which is conical in shape. Uropoda with the rami comparatively narrow.—Female: Body much broader than in male, with the last three pedigerous segments well-defined, and together forming an oblong oval division about three times as long as that preceding it. Cephalosome with the frontal part slightly produced and bidentate at the tip. Pleopoda in both sexes with the rami quite smooth, forming narrow sac-like plates not fitted for swimming but apparently respiratory in character. Color of male grayish white, with a light bluish tinge; of female, yellowish, semipellucid, with scattered brown dots. Length in both sexes, 4 mm."—G. O. SARS.[a]

Ohlin[b] also describes the color of the male as grayish white, that of the female wax-like yellow, and that of the larvæ yellowish-white or nearly white. The eyes are in all red-brownish.

Sars states that the adult animal is very sluggish in habit, the structure of the pleopoda showing it to be quite unable to swim. The larvæ, on the other hand, move through the water with great agility, and most probably at times lead a parasitic life on the skin of various fishes.

GNATHIA CERINA (Stimpson).[c]

Praniza cerina STIMPSON, Smithsonian Contributions to Knowledge, VI, 1853, p. 42, pl. III, fig. 31.

Anceus americanus STIMPSON, Smithsonian Contributions to Knowledge, VI, 1853, p. 42.

Praniza cerina VERRILL, Am. Jour. Sci. (3), VI, 1873, p. 439; VII, 1874, pp. 38, 41, 411, 502; Proc. Am. Assoc., 1873, pp. 350, 354, 358, 362 (1874).

Gnathia cerina HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 162; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 410–413, pl. XII, figs. 75–79.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 214; Proc. U. S. Nat. Mus., XXIII, 1901, p. 507.

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[a] Crust. of Norway, II, 1899, p. 55.

[b] Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 20–21.

[c] See Harger for excellent description of male, female, and larva.

Localities.—Bay of Fundy: Massachusetts Bay: off Salem: Gulf of Maine: Casco Bay: Gulf of St. Lawrence: Eastport, Maine: off Sable Island: La Have Bank: South of Martha's Vineyard.

Depth.—10–487 fathoms, in mud, gravel, stones, sand, and rocky bottom. On sculpin, on cod, and on *Lophohelia* (Harger).

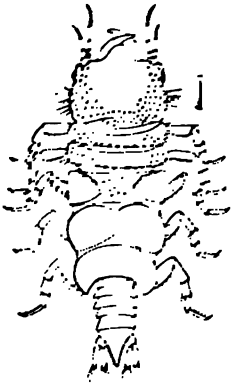

FIG. 43.—GNATHIA CERINA (AFTER HARGER). MALE.

Description of male.—Body oblong-ovate, more than twice as long as wide, 1½ mm. : 4 mm.

Head large, a little wider than long, 2 mm. : 1½ mm., with the anterior margin produced in a prominent rounded median lobe and the antero-lateral angles acutely produced. The eyes are small, round, composite, and situated at the sides of the head at the base of the antero-lateral lobes. The first pair of antennæ have the first two articles subequal; the third article is as long as the first two taken together. The flagellum is composed of four articles. The first pair of antennæ extend to the middle of the fourth article of the second antennæ. The first two articles of the second pair of antennæ are subequal; the third article is a little longer than the second; the fourth is nearly twice as long as the third. The flagellum is composed of seven articles. The mandibles are large and powerful and extend conspicuously in front of the head. The palp of the maxillipeds is composed of four articles.

The first segment of the thorax is small and almost inconspicuous, rudimentary, and consolidated with the head. The second and third segments of the thorax are subequal; the fourth segment is a little longer than either of the two preceding segments; the fifth and sixth are subequal, and are both longer than the fourth segment; the seventh segment is abruptly narrower than the sixth segment and is very

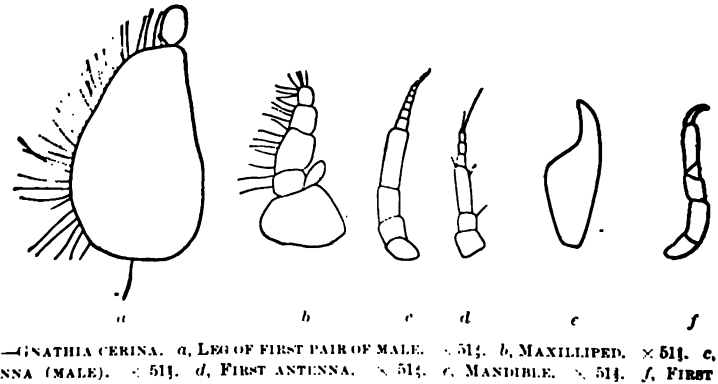

FIG. 44.—GNATHIA CERINA. *a*, LEG OF FIRST PAIR OF MALE. × 51⅓. *b*, MAXILLIPED. × 51⅓. *c*, SECOND ANTENNA (MALE). × 51⅓. *d*, FIRST ANTENNA. × 51⅓. *e*, MANDIBLE. × 51⅓. *f*, FIRST LEG OF LARVA. × 51⅓.

short, being only as long as the first abdominal segment, and narrower, about one-third as wide as the sixth thoracic segment; it could easily be taken for one of the abdominal segments.

The first five segments of the abdomen are short, distinct, and subequal in length; they are but little wider than the seventh thoracic segment, but abruptly narrower than the sixth thoracic segment. The sixth or terminal segment is triangular in shape, with apex very acute. The uropoda extend to the extremity of the abdomen. The inner branch is a little wider and a very little longer than the outer branch. Both are narrow, elongate, with extremities obliquely truncate, the post-lateral angles being rounded.

There are apparently only five pairs of thoracic legs. The first pair are modified and opercular, and are composed of only two articles. The seventh pair are wanting. The remaining five pairs are ambulatory.

Description of female.—Body ovate, about twice as long as wide, 2 mm.:4 mm. Head smaller than in male, with the front produced in a lobe which is emarginate in the middle. Eyes small, round, composite, and situated at the post-lateral angles of the head. Antennæ of both pairs as in male.

The first segment of the thorax is short and narrow and almost inconspicuous, appearing as a small lobe back of the head. The thorax becomes wider with the second thoracic segment. The second and third segments are short and about equal in length. The fourth and fifth are very long, many times longer than the preceding segments and scarcely to be distinguished, being somewhat fused dorsally. They are nearly subequal. The sixth segment is about half as long as the preceding segment, and becomes gradually narrower from the anterior to the posterior extremity. This segment is also somewhat fused dorsally with the preceding segment. The seventh segment is very short and narrow and not to be distinguished from the abdominal segments, being of the same length as the five anterior abdominal segments, but narrower.

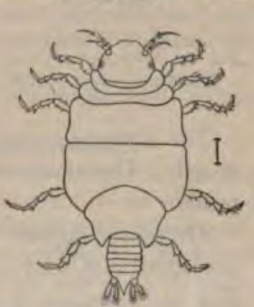

FIG. 45.—GNATHIA CERINA (AFTER HARGER). FEMALE.

The abdomen is similar to that in the male. The five posterior pairs of walking legs are similar to those in the male. The first pair of legs are composed of three articles and terminate in a minute rounded lobe. There is a delicate membraneous plate attached to the base of the first pair of legs.

The eggs are very clearly seen in the cavity of the thorax, which they almost completely fill.

Body of female smooth throughout its entire length.

Description of larva.—Body oblong-ovate, three times as long a wide, 1½ mm. : 4½ mm.

Head small, about ½ mm. long and ½ mm. wide at the base, with th front produced in a small truncated lobe. The eyes are large, round composite, situated at the sides of the hea and occupying almost the whole of the later margin. The first and second antennæ ar about as in the male.

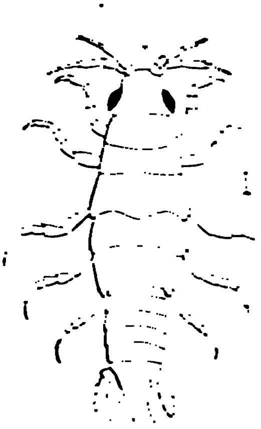
FIG. 46.—GNATHIA CERINA AFTER HARGER. LARVA.

The first segment of the thorax is rudimentary and consolidated with the head. Th second and third segments of the thorax ar short and subequal; the fourth and fifth segments are united into one extremely lon segment, which is also wider than the tw preceding segments. The sixth segment i short and gradually decreases in width, at it anterior extremity being almost as wide a the preceding elongated segment, but at it posterior extremity being almost as narro as the abdomen. The seventh segment i similar to the abdominal segments.

The abdomen is about ½ mm. wide. The first five segments are sub equal. The sixth or terminal segment and the uropoda are as in th male.

There are apparently but five pairs of legs. The first pair of leg are small and surround the mouth; they are composed of six article The seventh pair is wanting.

The mouth parts project conspicuously in front of the head.

Family IV. ANTHURIDÆ.

Body long and narrow, nearly cylindrical in form. Head comparatively small. Segments of thorax well defined and without distinc epimera. Abdomen comparatively short, with the anterior segment sometimes completely or partially fused. Mouth parts modified fo suction. First pair of legs larger and stronger than the others an subchelate; the two following pairs also subchelate, but smaller an more feeble; the four posterior pairs ambulatory. First pair of pleopoda large and expanded, more or less covering the others, especiall in female. Uropoda with the outer or superior branch arching ove the base of the telson.

[illegible] Trans. Zool [illegible]

ANALYTICAL KEY TO THE GENERA OF THE FAMILY ANTHURIDÆ.[a]

a. Labium terminating in two rounded lobes. Mandibles with cutting edge composed of two or three blunt teeth. First maxillæ simple, terminating in conspicuous and well-developed teeth. Maxillipeds with palp composed of one to four articles.

b. First five segments of abdomen coalesced into a single segment in the female. Maxillipeds with palp composed of two articles. Flagella of both pairs of antennæ rudimentary in both sexes. Flagellum of first pair not greatly developed in male .... Genus *Cyathura* Norman and Stebbing

b′. Segments of abdomen distinct in the female.

c. Maxillipeds with the palp composed of a single article. Flagella of both pairs of antennæ in the female composed of only a few articles. In the male the first pair has a multi-articulate flagellum. Mandible with a one-jointed palp .... Genus *Ptilanthura* Harger

c′. Maxillipeds with a palp composed of four articles. Flagella of both pairs of antennæ multi-articulate; that of first pair in the male developed into a remarkable brush-like organ. Mandible with a three-jointed palp. Genus *Anthelura* Norman and Stebbing

a′. Labium terminating in two points, acuminate. Mandibles without teeth, terminating in an acutely pointed lancet-like organ. First maxillæ simple, spear-like, terminal part armed with recurved teeth. Maxillipeds with basal part narrow, oblong; palp composed of three articles. Segments of abdomen distinct in female.

b. All seven pairs of legs present in adult. Seventh thoracic segment normal, well developed.

c. Both pairs of antennæ in both sexes with multi-articulate flagella. Genus *Calathura* Norman and Stebbing

c′. First pair of antennæ in both sexes have the flagellum multi-articulate. Second pair of antennæ in both sexes have a rudimentary flagellum composed of a single article............ Genus *Paranthura* Bate and Westwood

b′. Seventh pair of legs absent in adult. Seventh thoracic segment very short, abruptly narrower than preceding sixth segment and not as wide as the abdominal segments. First pair of antennæ composed of four articles, the last article being the rudimentary flagellum. Second pair of antennæ composed of five articles.......................... Genus *Colanthura* Richardson

13. Genus CYATHURA Norman and Stebbing.[b]

First five segments of abdomen coalesced into a single segment in the female. Flagella of both pairs of antennæ rudimentary. Maxillipeds with a palp composed of two articles. Mouth parts otherwise as in *Ptilanthura* and *Anthelura*.

CYATHURA CARINATA (Krøyer).[c]

? *Anthura gracilis* De Kay, Zool. New York, Crust., 1844, p. 44, pl. IX, fig. 34.

Anthura carinata Krøyer, Naturh. Tidsskr. (2), II, 1846–49, p. 402; Voy. en Scand., 1849, pl. XXVII, fig. 3.

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[a] Norman and Stebbing's key has been used with slight modifications. See Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, pp. 121–122.

[b] See Norman and Stebbing, Trans. Zool. Soc., Lond., XII, 1886, Pt. 4, p. 121, for characters of genus.

[c] Norman and Stebbing give an excellent description of this form.

Anthura polita STIMPSON, Proc. Acad. Nat. Sci., Phila., VII, 1856, p. 393.

Anthura carinata SCHIŒDTE, Naturh. Tidsskr. (3), X, 1875–76, p. 211, pl. IV, figs. 1–14.

Anthura brunnea HARGER, with VERRILL, Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, p. 572 (278); p. 426 (132).

Anthura carinata SCHIŒDTE, Ann. Mag. Nat. Hist. (4), XVIII, 1876, p. 253.—MEINERT, Naturh. Tidsskr. (3), XI, 1877, p. 77.

Anthura polita HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 162; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 398–402, pl. XI, figs. 68–69.

Anthura carinata MEINERT, Naturh. Tidsskr. (3), XII, 1880, p. 470.

Cyathura carinata NORMAN and STEBBING, Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, pp. 124–125.

Anthura carinata KUHLGATZ, Wissenchaftliche Meeresuntersuchunger, III, 1898, pp. 148–149, pl. III, figs. 4–19.

Cyathura carinata RICHARDSON, American Naturalist, XXXIV, 1900, p. 215; Proc. U. S. Nat. Mus., XXIII, 1901, p. 508.

Localities.—Norfolk, Virginia; Great Egg Harbor, New Jersey; Long Island Sound: Noank Harbor, Connecticut; off Block Island; East Providence, Rhode Island; Vineyard Sound; Gloucester, Massachusetts; Greenland; Denmark; Kielerbucht, Germany (Karl Moebius).

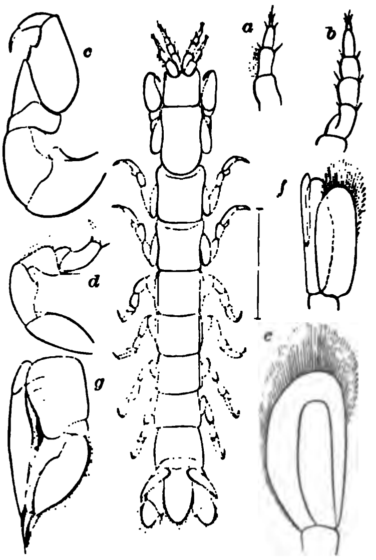

FIG. 47.—CYATHURA CARINATA (AFTER HARGER). *a*, FIRST ANTENNA. × 10. *b*, SECOND ANTENNA. × 10. *c*, FIRST LEG. × 8. *d*, THIRD LEG. × 8. *e*, FIRST PLEOPOD. × 8. *f*, SECOND PLEOPOD OF MALE. × 8. *g*, LATERAL VIEW OF ABDOMEN. × 6.

Depth.—Surface to 19½ fathoms, in shells and mud, eel-grass and algæ, sand and stones. (Harger.)

Body very narrow, elongate, a little more than seven times longer than wide, 2 mm. : 15 mm.

Head a little wider than long, 1 mm. : 1½ mm., with the anterior margin excavate on either side of a small median point. Eyes small, distinct. The first pair of antennæ have the first two articles about equal in length; the third article is a little shorter than the second; the fourth or flagellar article is about half as long as the third. The first antennæ extend to the end of the fourth article of the second antennæ. The second pair of antennæ have the basal article short; the second article is about twice as long as the first; the third article is half as long as the second; the fourth is a little shorter than the third; the fifth is one and a half times longer than the fourth; the sixth or flagellar article is very short and is about half as long as the fifth. The second antennæ are 1½ mm. long. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

The first, fourth, and fifth segments of the thorax are 2 mm. in length. The second and third segments are 1½ mm. long. The sixth and seventh segments are each 1½ mm. long. The epimera are long and extremely narrow plates extending the entire length of the segments and not separated off by distinct sutures.

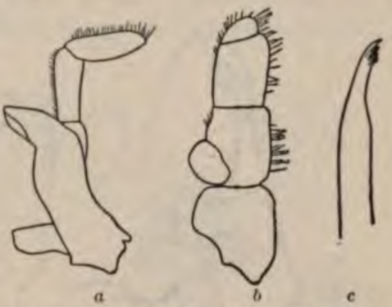

FIG. 48.—CYATHURA CARINATA. *a*, MANDIBLE. × 51⅓. *b*, MAXILLIPED. × 51⅓. *c*, FIRST MAXILLA. × 51⅓.

The entire length of the abdomen is 3½ mm., or a little less than one-fifth the entire length of the body. The first six segments are fused into a single segment about 1½ mm. long, which has no trace of suture lines. The seventh segment or telson is narrow, elongate, and rounded posteriorly. The peduncle of the uropoda is as long as the superior branch and extends two-thirds the length of the telson. The inner, lateral branch is placed at the posterior end of the peduncle and is rounded posteriorly; it extends the remaining third of the length of the telson and reaches the extremity of that segment. The dorsal or superior branch does not arch over the telson, but lies directly upon its dorsal surface; it extends to the end of the peduncle, is somewhat triangular in shape, narrow and elongate, with apex acute.

The first three pairs of legs are prehensile. All the others are ambulatory in structure. The first pair are larger and stronger than the two following pairs, and there is a tooth on the inferior margin of the propodus.

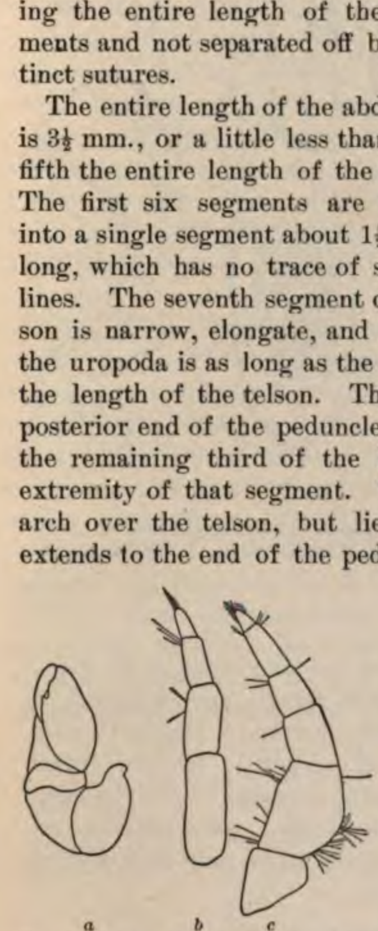

FIG. 49.—CYATHURA CARINATA. *a*, FIRST LEG. × 11⅓. *b*, FIRST ANTENNA. × 20⅓. *c*, SECOND ANTENNA. × 20⅓.

Three specimens—one from Marco, Florida, another from Cedar Keys, Florida, and a third from off South Carolina—differ from the other specimens in the collection, in having the last article of the first pair of antennæ as long as the third; in having a rounded prominence instead of a tooth on the propodus of the first pair of legs; in having the anterior segments of the abdomen quite apparent at the sides, though fused and not apparent in the middle of the dorsal surface; in having the peduncle of the uropoda about half the length of the telson instead of two-thirds its length, the inner branch being as long as the peduncle; in having the fourth, fifth, and sixth segments of the thorax subequal and each about one-half mm. longer than any of the other segments, which are about subequal, and in having the second article of the palp of the maxillipeds quadrate and as large as the first article of the palp.

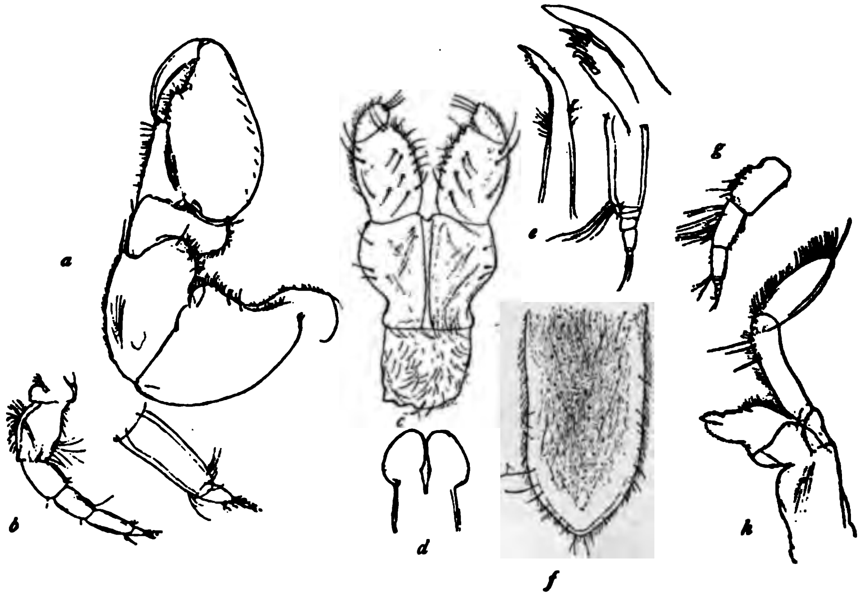

FIG. 50.—CYATHURA CARINATA (AFTER NORMAN AND STEBBING). *a*, FIRST GNATHOPOD. *b*, LOWER ANTENNA. *c*, MAXILLIPED. *d*, LABIUM. *e*, FIRST MAXILLA. *f*, END OF TELSON. *g*, UPPER ANTENNA. *h*, MANDIBLE AND PALP.

14. Genus PTILANTHURA[a] Harger.

First five segments of abdomen distinct in the female and in the male. The flagella of both pairs of antennæ in the female are composed of only a few articles. In the male, the first pair has a multiarticulate flagellum. The maxillipeds have a palp of one article, which is broad and flattened and similar to the basal article; epignath small, rounded. Labium terminating in two broadly rounded lobes. First maxillæ terminating in well-developed teeth. Mandibles with a palp composed of a single article.

PTILANTHURA TENUIS Harger.[b]

Ptilanthura tenuis HARGER, Am. Jour. Sci. (3), XV, 1878, p. 377; Proc. U. S. Nat. Mus., 1879, II, p. 62; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 406–408, pls. XI, XII, figs. 71–74.

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[a] See Harger, Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 405–406, for characters of genus.

[b] See Harger for complete description of this species.

Anthura tenuis Norman and Stebbing, Trans. Linn. Soc. London, XII, 1886, Pt. 4, p. 124.—Richardson, American Naturalist, XXXIV, 1900, p. 215; Proc. U. S. Nat. Mus., XXIII, 1901, p. 508.

Ptilanthura tenuis Stebbing, Willey's Zool. Results, 1902, p. 619.

Localities.—Noank Harbor, Connecticut; Long Island Sound; off Watch Hill, Rhode Island; off Block Island; Waquoit, Vineyard Sound; Casco Bay, Maine; Bay of Fundy; Grand Menan, New Brunswick.

Depth.—Surface to 19 fathoms. Taken on muddy bottom; in sand, mud, and stones; at low water, in sand.

Body extremely narrow, elongate, about eight times longer than wide, 1 mm.: 8½ mm. Head about as wide as long, with the anterior margin triangularly produced in a small median process. Eyes small, round, distinct, and situated in the antero-lateral angles of the head. The second pair of antennæ have the basal article short; the second article is twice as long as the first; the third and fourth are short and subequal, both together being as long as the basal article; the fifth is twice as long as the fourth; the flagellum is composed of four articles, the first of which is about half as long as the last peduncular article. The second pair of antennæ extend to the end of the fourth article of the peduncle of the first pair of antennæ. The first pair of antennæ have the first article long; the second and third are subequal and each is a little longer than the first. The first article of the flagellum is very short, about one-third as long as the second peduncular article; the second article of the flagellum is about twice as long as the first. The flagellum is composed of twenty-one articles, which are furnished with long hairs. The first antennæ are 2½ mm. long. The maxillipeds have a palp of one article. The palp of the mandibles is composed of one article.

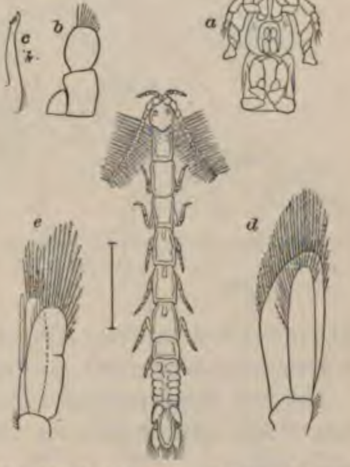

Fig. 51.—Ptilanthura tenuis (after Harger). *a*, Head with antennæ and first thoracic segment (ventral side). × 8. *b*, Maxilliped. × 50. *c*, First maxilla. *d*, First pleopod. × 20. *e*, Second pleopod of male. × 20.

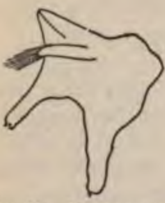

Fig. 52.—Ptilanthura tenuis. Mandible. × 77½.

The first, second, third, and sixth segments of the thorax are subequal, each being 1 mm. in length. The fourth and fifth segments are a little longer. The seventh segment is half a mm. long.

The first six segments of the abdomen are short, distinct, and subequal, with the exception of the last, which is about half as long as any of the five preceding ones. The seventh segment or telson is long and narrow, with the extremity rounded. The peduncle of the uropoda is short and extends only half the length of the telson. The inner lateral branch is placed at the extremity of the peduncle; it does not quite reach the extremity of the telson, and is posteriorly rounded. The outer and superior branch extends to the end of the peduncle and is somewhat triangular in shape, with apex acute.

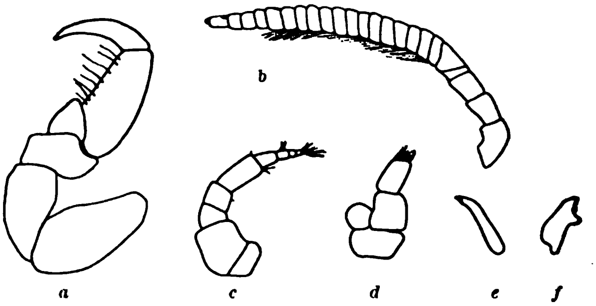

FIG. 53.—PTILANTHURA TENUIS. *a*, FIRST LEG. × 51½. *b*, FIRST ANTENNA. × 27½. *c*, SECOND ANTENNA. × 51½. *d*, MAXILLIPED. × 51½. *c*, FIRST MAXILLA. × 51½. *f*, MANDIBLE (WITHOUT PALP). × 51½.

The first three pairs of legs are prehensile, the first pair being much larger and stouter than the two following pairs. All the others are ambulatory.

15. Genus ANTHELURA Norman and Stebbing.[a]

Segments of abdomen distinct in female. Flagella of both pairs of antennæ multi-articulate; that of first pair "in the male developed into a remarkable brush-like organ nearly equal in length to half the animal, and composed of very numerous, short, broad, and densely ciliated joints." Maxillipeds with a palp composed of four articles. Mouth parts otherwise as in *Cyathura*.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ANTHELURA.

a. Uropoda with the outer and upper plates wide apart dorsally, broadly triangular or spear-shaped, nearly as long as the inner plate, which is similar in form but narrower. Telson broadly lanceolate, apex rather acute, about equal in length to the uropods.... ....*Anthelura abyssorum* Norman and Stebbing

a'. Uropoda with the outer and superior branches meeting dorsally, long, oval in form. Inner branch with posterior margin widely rounded. Telson narrowly linguiform, roundly triangular at the apex. Outer and superior branch as long as telson. Inner branch extending beyond telson..*Anthelura affinis* Richardson

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[a] See Norman and Stebbing for characters of genus. Trans. Zool. Soc., Lond., XII, 1886, Pt. 4, p. 121.

ANTHELURA ABYSSORUM Norman and Stebbing.

Anthelura abyssorum NORMAN and STEBBING, Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, pp. 127–128, pl. XXVII, fig. 2.—HANSEN, Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn, 1887–1888, p. 181.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 215; Proc. U. S. Nat. Mus., XXIII, 1901, p. 508.

Localities.—Near entrance of Davis Straits; latitude 59° 10′ north, longitude 50° 25′ west.

Depth.—1,750 fathoms.

"Head and peræon of nearly equal width throughout; second segment of the latter scarcely at all constricted behind. The whole of the segments smooth above, and devoid of all furrowing and pitting; last segment of peræon half as long as the preceding segments of pleon, very clearly defined, and (exclusive of telson) subequal in length to penultimate segment of peræon.

"The antennæ have the joints of the peduncle in both pairs flattened, the lower pair touching each other with the compressed inner margins, and appearing between the upper pair, as in *Anthelura elongata;* flagella of both pairs many jointed.

"First gnathopods having basos short and very thick; ischium scarcely longer, and not so broad; cup of meros well rounded; carpus small as usual, bearing five or six spine-like setæ; hand about twice as long as greatest breadth; palm concave, bearing about eight slender spine-like setæ.

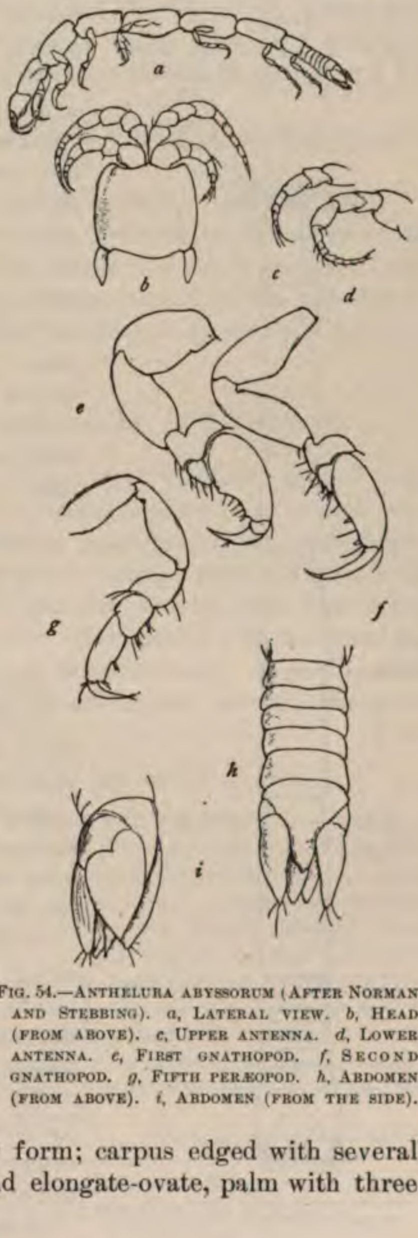

FIG. 54.—ANTHELURA ABYSSORUM (AFTER NORMAN AND STEBBING). *a*, LATERAL VIEW. *b*, HEAD (FROM ABOVE). *c*, UPPER ANTENNA. *d*, LOWER ANTENNA. *e*, FIRST GNATHOPOD. *f*, SECOND GNATHOPOD. *g*, FIFTH PERÆOPOD. *h*, ABDOMEN (FROM ABOVE). *i*, ABDOMEN (FROM THE SIDE).

"Second gnathopods having basos and ischium more slender than in first pair; meros of similar form; carpus edged with several spine-like setæ and one spine; hand elongate-ovate, palm with three spines and a few setæ.

"Last peræopods having the propodus half as long again as the carpus, and the dactylos subequal to the carpus; carpus and propodus each furnished with two forked spines on their anterior margin.

"First pleopods large, covering the whole of the remaining pleopods, against which they are closely pressed.

"Uropods with outer and upper plates wide apart dorsally, broadly triangular or spear-shaped, longer than wide, and as long or nearly as long as the inner plate, which is very similar in form but narrower, with well-rounded extremities; both are tipped with a few setæ, which are, however, very easily abraded.

"Telson much depressed, broadly lanceolate, apex rather acute, about equal in length to the uropods.

"Length, 9 mm., or about three-sixteenths of an inch."—NORMAN and STEBBING.[a]

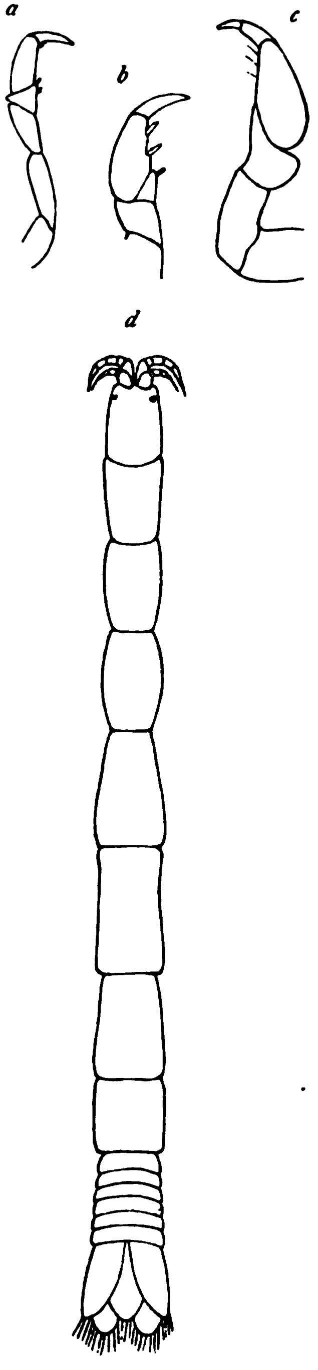

FIG. 55.—ANTHELURA AFFINIS. *a*, SIXTH PERIOPOD. *b*, SECOND GNATHOPOD. *c*, FIRST GNATHOPOD. *d*, GENERAL FIGURE.

ANTHELURA AFFINIS Richardson.

Anthelura affinis RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 288–289, pl. XXXVIII, figs. 29–32.

Locality.—Bermudas.

Body narrow, elongate. Head with small median point. Eyes distinct, situated in antero-lateral angulations.

Antennæ of both pairs with flagella consisting of several joints, and fringed with long hairs at the tip. Maxillipeds consist of five joints.

First three thoracic segments about equal in length. Three following segments somewhat longer, and subequal. Seventh segment fully half the length of preceding segment.

All the segments of the abdomen distinctly defined. Terminal segment narrowly linguiform, roundly triangulate at the apex and with smooth margins.

Outer superior branch of uropoda long, oval, reaching quite to the extremity of

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[a] Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, pp. 127–128.

the terminal abdominal segment, and arching over the telson. Inner branch with posterior margin widely rounded and extending beyond telson. Both branches have the margins smooth, entire.

First gnathopods with small hand. Dactylus short. Free inner margin of propodus furnished with hairs. Second gnathopods and first periopods similar in shape to, but smaller in size than first pair of gnathopods. The free inner margin of the propodus is beset with two spines, the carpus with one spine. The remaining periopods have a single spine at the distal margin of the propodus and two spines on the carpus.

One specimen, a female, was collected by Prof. A. E. Verrill at the Bermudas in 1901.

Type in Peabody Museum of Yale University. Cat. No. 3349.

This species differs from *A. elongata* Norman, in the shape of the outer branch of the uropoda; in the length of both branches, as compared with the terminal abdominal segment, and in the fact that the margins of the outer branch in this species are smooth and not crenulate, as in *A. elongata*.

16. Genus CALATHURA Norman and Stebbing.[a]

Abdomen short with the segments not very distinctly defined in the male, but distinct in the female. Both pairs of antennæ in both sexes with multi-articulate flagella. Buccal mass projecting, cone-shaped. Anterior lip terminating in an obtusely conical point. Posterior lip slightly bifid at the tip. Anterior maxillæ simple, spear-like; terminal part armed with recurved teeth. Maxillipeds with the basal part narrow, oblong; palp composed of three articles; epignath small, rounded. Mandibles terminating in an acutely-pointed lancet-like organ.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CALATHURA.

a. Eyes not conspicuous. First pair of antennæ with flagellum twelve jointed, not longer than the length of the head. Second pair of antennæ with the flagellum twelve jointed. First three segments of thorax bounded laterally by carinæ. Terminal segment of body triangular, acute at apex, margin not crenulate. Superior or outer branch of uropoda oval in form, slightly dentated. Inner branch acutely triangular........................ *Calathura branchiata* (Stimpson)

a′. Eyes conspicuous. First pair of antennæ with flagellum seventeen jointed, more than twice as long as the length of the head. Second pair of antennæ with the flagellum twenty-three jointed. First three segments of thorax not bounded laterally by carinæ. Terminal segment of body linguate, rounded posteriorly, with crenulate margin. Superior or outer branch of the uropoda narrow, elongated, not dentated. Inner branch rounded.
Calathura crenulata Richardson

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[a] See Sars, Crust. of Norway, II, 1899, pp. 44-45, and Norman and Stebbing, Trans. Zool. Soc. Lond., XII, 1886, Pt. 4, p. 122, for characters of genus.

CALATHURA BRANCHIATA (Stimpson).[a]

Anthura branchiata STIMPSON, Smithsonian Contributions to knowledge, VI, 1853, p. 43.

Paranthura norvegica G. O. SARS, Vidensk. Selsk. Forhandl., 1873, p. 88.

Anthura branchiata VERRILL, Am. Jour. Sci. (3), V, 1873, p. 101; VII, 1874, pp. 42, 411, 502; Proc. Amer. Assoc., 1874, pp. 350, 357.—HARGER, with VERRILL; Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, pp. 511 (217), 573 (279).—SMITH and HARGER, Trans. Conn. Acad. Sci., III, 1874, p. 16.

Paranthura arctica G. O. SARS, Archiv for Math. og Naturv., 1877, p. 347.—HELLER, Denk. Ak. Wien, XXXV, 1878, p. 38–39, pl. IV, figs. 9–12.

Paranthura branchiata HARGER, Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 402–405, pl. XI, fig. 70.

Calathura branchiata NORMAN and STEBBING, Trans. Linn. Soc. Lond., XII, 1886, Pt. 4, pp. 131–133, pl. XXVI, fig. 1.

Paranthura branchiata HANSEN, Dijmphna Togtets zool.-bot. Udbytte, 1887, pp. 203–204.

Calathura branchiata HANSEN, Vedenskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–1888, p. 181.

Paranthura branchiata AXEL OHLIN, Akademisk Afhandling, XXII, 1895, pp. 12–13.

Calathura branchiata SARS, Crust. Norway, II, 1899, pp. 46–47, pl. XIX, fig. 2.—STEBBING, Ann. Mag. Nat. Hist. (7), V, 1900, p. 13.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 215; Proc. U. S. Nat. Mus., XXIII, 1901, p. 509.—AXEL OHLIN, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 17–20.

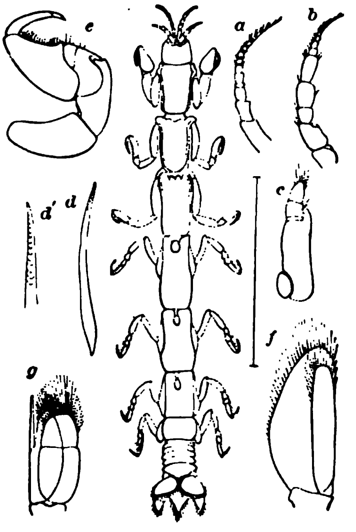

FIG. 56.—CALATHURA BRANCHIATA (AFTER HARGER). *a*, FIRST ANTENNA. × 8. *b*, SECOND ANTENNA. × 8. *c*, RIGHT MAXILLIPED. × 16. *d*, FIRST MAXILLA. × 16. *d'*, DISTAL END OF SAME. × 50. *e*, FIRST LEG. × 8. *f*, FIRST PLEOPOD. × 8. *g*, SECOND PLEOPOD OF MALE. × 8.

Localities.—Bay of Fundy; Vineyard Sound; Georges Bank; Eastport, Maine; Gulf of Maine; west of Jeffreys Ledge; Casco Bay; Nova Scotia; between Misaine Bank and Middle Ground; off Head Harbor; between Middle Ground and Halifax; southeast from Cape Sable; latitude 70° 8′ north, longitude 74° 20′ west; also Franz Josefs Land, Kara Sea, Greenland, Jan Mayen, Spitzbergen, off Norway, Scotland, Ireland, and between England and the Bay of Biscay; latitude 70° north, longitude 58° 38′ west; Umanak; latitude 71° 10′ north, longitude 58° 56′ west; latitude 72° 20′ north, longitude 59° 39′ west (Hansen); latitude 71° 35′ north, longitude 22° 47′ east, between Norway and Beeren Island; latitude 73° 27′ north, longitude 23° 11′ east, between Norway and Beeren Island; latitude 77° 25′ north, longitude 27° 30′ east, north of Hope Island; latitude 76° 46′ north, longitude 15° 22′ east, off Horn Sound, West Spitzbergen; King Charles Island, Bremer Sound; latitude 78° 50′ north, longitude 27° 39′ east, King Charles Island; latitude 78° 50′ north, longitude 29° 39′ east, King Charles Island; latitude 81° 14′ north, longitude 22° 50′ east, northeast of Seven Islands; latitude 79° 58′ north, longitude 9° 30′ east; 19′–20′ north of Danish Island; latitude 73° 3′ north, longitude 18° 30′ east, between Beeren Island and Norway (Ohlin); latitude 71° 31′ north, longitude 49° 12′ east (Stebbing).

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[a] See Norman and Stebbing for more detailed description.

Depth.—10–250 fathoms; 20–460 m., in mud, clay, gravel, stones, rocks, barnacles, sand, and shells.

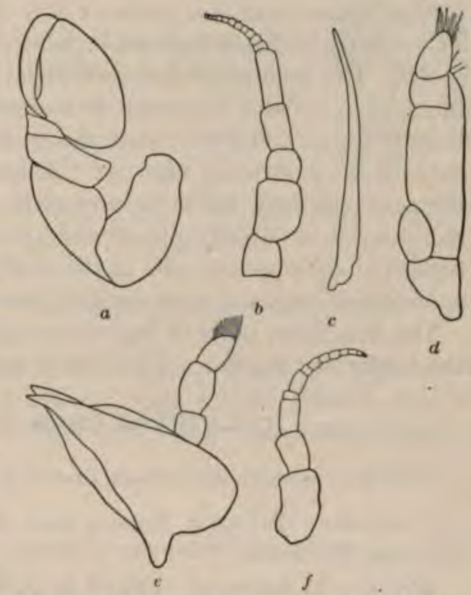

FIG. 57.—CALATHURA BRANCHIATA. *a*, FIRST LEG. × 11½. *b*, SECOND ANTENNA. × 20½. *c*, FIRST MAXILLA. × 39. *d*,[a] MAXILLIPED. × 39. *e*, MANDIBLE. × 39. *f*, FIRST ANTENNA. × 20½.

Body extremely narrow and elongate, about ten and a half times longer than broad, 2½ mm.: 26 mm.

Head a little wider than long, 1½ mm.: 2 mm., becoming slightly narrower toward the anterior end, which is 1½ mm. wide, and has the frontal margin excavate on either side of a small median point. The eyes are absent. The first pair of antennæ have the three peduncular articles about equal in length but decreasing in size, the basal one being the largest. The flagellum is composed of ten articles, and extends to the end of the peduncle of the second pair of antennæ. The second pair of antennæ have the basal article short; the second is nearly twice as long; the third is half as long as the second; the fourth is twice as long as the third and about as long as the second, but more slender; the fifth is a little longer than the fourth, about one and a third times longer. The flagellum is composed of eleven articles. The second pair of antennæ are about 3 mm. long. The maxillipeds have a palp of three articles. The palp of the mandibles is composed of three articles.

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[a] Basal article of palp not shown in drawing.

The first segment of the thorax is 2½ mm. long; the second and third are subequal and each is 3 mm. in length; the fourth segment is 4 mm. long; the fifth segment is 3 mm. long; the sixth is 2½ mm.; the seventh is 1 mm. in length. The segments are long and narrow and have no epimera separated off. The second and third segments have each at the anterior end two small tubercles, one on either side of the median line. The fourth, fifth, and sixth segments have each a small depression at the anterior end in the median line.

The abdomen is short, being only 4 mm. in length, or less than one-sixth the entire length of the body. The first six segments are indistinctly defined, and are more or less fused in the median dorsal line. The seventh and last segment or telson is triangular in shape with apex acute. The peduncle of the uropoda is broad and extends two-thirds the length of the terminal abdominal segment. The inner lateral branch is small and placed at the posterior end of the peduncle and extends the remaining third of the length of the terminal abdominal segment, reaching the extremity of that segment. The outer or superior branch is dorsally placed and arches over the telson, meeting the branch of the opposite side in the median dorsal line; it is about twice as broad as long and is posteriorly truncate.

The first three pairs of legs are prehensile, the first pair being much the larger and stouter. The four remaining pairs are ambulatory.

CALATHURA CRENULATA Richardson.

Calathura crenulata RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 509–510.

Localities.—Between Nassau and Andros Island, Bahamas; Cape Catoche, Yucatan.

Depth.—21 fathoms. Found in gulf weed.

Head half as long as first thoracic segment, frontal margin with small median point and prominent lateral angles. Eyes large, distinct, and very black. First pair of antennæ more than twice as long as the length of the head; flagellum about seventeen jointed. Second pair of antennæ somewhat longer than first pair, with joints of flagellum stouter; flagellum about twenty-three jointed.

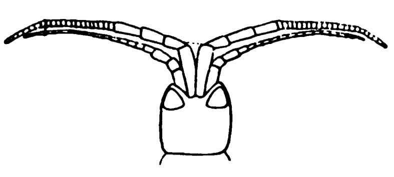

FIG. 58.—CALATHURA CRENULATA. HEAD.

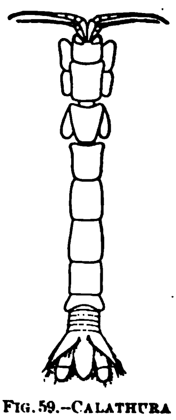

FIG. 59.—CALATHURA CRENULATA.

First six thoracic segments long and narrow; second segment narrower posteriorly than anteriorly; last segment very short, one-third shorter than preceding segment. Abdomen with all the segments distinct. Terminal segment long, lingulate in shape, rounded posteriorly with crenulate margin. Outer branches of the uropoda arch over telson, but do not meet in center; narrow, elongated. Inner branches of the uropoda extend beyond telson, are rounded posteriorly, and shorter than peduncular joint; inner margins crenulate. Abdomen about equal in length to fifth and sixth thoracic segments taken together.

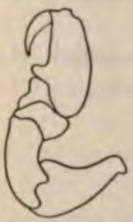

FIG. 60.—CALATHURA CRENULATA. FIRST GNATHOPOD.

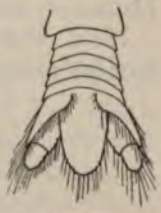

FIG. 61.—CALATHURA CRENULATA. ABDOMEN.

First pair of gnathopods large, subchelate; second pair of gnathopods and first pair of pereiopods subchelate, small. Other pereiopods ambulatory, slender.

One specimen (type) sent by Mr. F. Stearns to the U. S. National Museum comes from between Nassau and Andros Island, Bahamas. Another specimen was taken by the U. S. Bureau of Fisheries steamer *Albatross* off Cape Catoche, Yucatan.

Type.—Cat. No. 23900, U.S.N.M.

17. Genus PARANTHURA Bate and Westwood.

Segments of abdomen distinct in both sexes. First pair of antennæ have the flagellum multiarticulate in both sexes. Second pair of antennæ in both sexes have a rudimentary flagellum consisting of a single article.

Mouth parts as in *Calathura*.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS PARANTHURA.

a. Flagellum of first pair of antennæ composed of nine articles. First three segments of thorax of equal length; the three following subequal and each one-third shorter than either of first two. First five segments of abdomen one-half the length of seventh thoracic segment. Last abdominal segment funnel-shaped; posterior margin coarsely denticulate and truncate. *Paranthura infundibulata* Richardson

a′. Flagellum of first pair of antennæ composed of six to seven articles. First five segments of thorax of equal length; sixth segment somewhat shorter than any of preceding segments. First five segments of abdomen as long as seventh thoracic segment. Last abdominal segment long and narrow, rectangular in shape, with margins entire...................... *Paranthura verrillii* Richardson

PARANTHURA INFUNDIBULATA Richardson.

Paranthura infundibulata RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 284–286, pl. XXXVIII, figs. 15–20.

Locality.—Bermudas.

Male.—Body narrow, elongate; color yellow, with markings of black.

Head with antero-lateral angles prominent, between which the frontal margin is excavate for the reception of the antennæ, the middle being produced in a conspicuous median point. The eyes are situated in the antero-lateral prolongations.

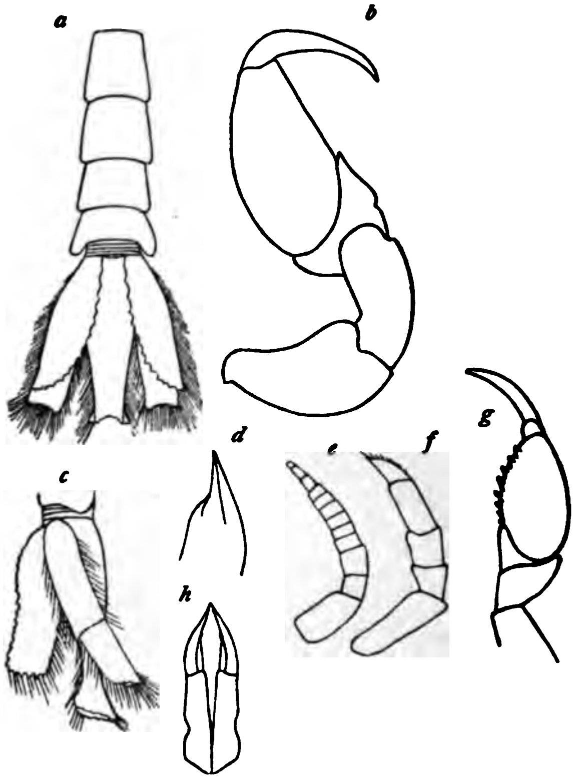

FIG. 62.—PARANTHURA INFUNDIBULATA. *a*, LAST FOUR THORACIC SEGMENTS AND ABDOMEN. *b*, FIRST GNATHOPOD. *c*, LATERAL VIEW OF ABDOMEN. *d*, MANDIBLE. *e*, ANTENNA OF FIRST PAIR. *f*, ANTENNA OF SECOND PAIR. *g*, SECOND GNATHOPOD. *h*, MAXILLIPEDS.

The first pair of antennæ have the basal joint long, oblong in shape, the other two joints of the peduncle being short and about equal in length; the flagellum consists of nine joints.

The second pair of antennæ have the second joint of the peduncle very long, slightly exceeding in length the first and second peduncular joints of the first pair of antennæ. The second antennæ are geniculate at the articulation of the second and third joints. The other three joints following the second are of nearly equal length. The flagellum consists of a single tapering joint, furnished with hairs.

The first three thoracic segments are about equal in length, elongate, the first two having their posterior angles rounded. The fourth, fifth, and sixth segments are equal in length and one-third shorter than the first three. The seventh segment is about half as long as the preceding one, and has the posterior angles produced downward.

The segments of the abdomen are distinct and very short, all five anterior to the terminal segment being no longer than half the length of the seventh thoracic segment. The terminal segment is long and narrow, of the same width throughout its length, except at the apex, where the lateral margins are abruptly drawn out into processes, which curve upward, giving a funnel-shaped appearance to the posterior end of the segment, which is very concave. The posterior margin is truncate and coarsely denticulate.

The inner branches of the uropoda do not quite reach the extremity of the terminal abdominal segment. The basal joint is about half the length of the terminal abdominal segment. The inner branch is extremely concave, with its entire margin denticulate, its ventral surface having a longitudinal carina. The outer and superior branch is long and narrow, quadrangular and somewhat narrowed posteriorly, and from the middle slightly curving upward, coarsely denticulate on its inner lateral and posterior margin, the teeth being rather widely separated. The branches of the uropoda and the terminal abdominal segment are fringed with hairs.

The first, second, and third pairs of legs are subcheliform. The second and third pairs have the propodus similar in shape to the first pair, but more slender, and armed on their posterior margin with seven or eight large conspicuous spines. The other legs are longer and more slender, and armed with four spines on the anterior margin of both the carpus and the propodus.

A number of specimens, all males, were collected by Dr. George Brown Goode in 1876–77 at the Bermudas.

Type specimens in Peabody Museum, Yale University. Cat. No. 3207.

PARANTHURA VERRILLII Richardson.

Paranthura verrillii Richardson, Trans. Conn. Acad. Sciences, XI, 1902, p. 286, pl. xxxviii, figs. 21–22.

Locality.—Bermudas.

Body narrow, elongate. Color dark brown, with scattered black dots.

Head with lateral angulations prominent, rounded, between which the front is excavate on either side of a small median point. Eyes large, situated in the lateral angulations.

First pair of antennæ have the first joint of the peduncle oblong, the other two shorter and about equal in length, flagellum six to seven jointed. The second pair of antennæ have a five-jointed peduncle (the first joint being short and indistinct), of which the second and fifth joints are longest, the flagellum being consolidated into a single flattened, tapering joint, furnished with hairs.

The first five thoracic segments are of equal length. The sixth is somewhat shorter than any of the others, and the seventh is half as long as the sixth.

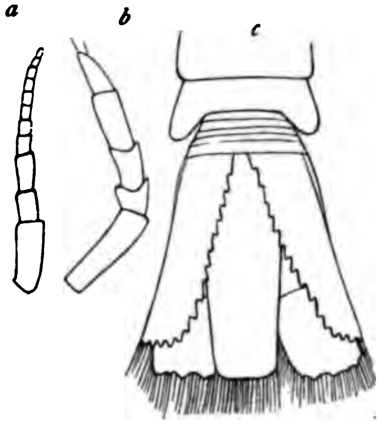

FIG. 63.—PARANTHURA VERRILLII. *a*, ANTENNA OF THE FIRST PAIR. *b*, ANTENNA OF THE SECOND PAIR. *c*, LAST TWO THORACIC SEGMENTS AND ABDOMEN.

The abdominal segments are distinct, the first five taken together being no longer than the seventh thoracic segment. The terminal abdominal segment is long and narrow, rectangular in shape, with margins entire. The basal joint of the uropoda is half as long as the terminal segment of the abdomen; the inner branch is rectangular, coarsely denticulate, and reaches the apex of the telson. The outer superior branch is narrow, elongate, rectangular, with margins coarsely denticulate, the teeth being close together.'

The branches of the uropoda and the terminal abdominal segment are fringed with long hairs.

The first three pairs of legs are subchelate. The second and third pairs have the posterior margin of the propodus armed with spines, as in the preceding species. In the four following pairs of legs the anterior margin of the propodus is armed with four spines.

A single female was collected by Prof. A. E. Verrill and party in 1898 at the Bermudas. Depth, 1-2 feet.

Type specimen in Peabody Museum, Yale University. Cat. No. 3186.

This species is named in honor of Prof. A. E. Verrill of Yale University.

18. Genus COLANTHURA Richardson.

Body narrow, elongate. First pair of antennæ composed of four joints, the last joint being the flagellar joint. Second pair of antennæ composed of five joints, the terminal joint fringed with hairs.

The first six segments of the thorax large, the seventh very short, abruptly narrower than the sixth, not as wide as the abdominal segments and devoid of legs.

The first three pairs of legs are subchelate, the three following pairs ambulatory.

The abdominal segments are well defined and distinct from one another. The terminal abdominal segment is rounded, entire. The inner branch of the uropoda is likewise rounded; the outer and superior branch arches over the telson.

This genus agrees with both *Hyssura* Norman and Stebbing and *Cruregans* Chilton in the absence of the seventh pair of legs, but differs from the first named in the structure of the antennæ, both pairs of antennæ in *Hyssura* having multi-articulate flagella; in the structure of the outer branch of the uropoda, which in *Hyssura* does not arch over the telson; and in the structure of the mouth parts. *Colanthura* differs from *Cruregans* in the presence of eyes, which are wanting in *Cruregans*, and in the structure of the outer branch of the uropoda, the outer branch in *Cruregans* being very narrow and not arching over the squamiform telson, while in *Colanthura* the outer branch is broad and arches over the rounded terminal segment. The structure of the mouth parts is the same as found in the genera *Paranthura*, *Calathura*, and *Cruregans*.

COLANTHURA TENUIS Richardson.

Colanthura tenuis Richardson, Trans. Conn. Acad. Sciences, XI, 1902, pp. 287–288, pl. xxxviii, figs. 23–28.

Locality.—Bermudas.

Body narrow, elongate; surface smooth; color light yellow. Head with a prominent median process extending between the first pair of antennæ. Antero-lateral angles prominent, produced, reaching the distal end of the first joint of the peduncle of the first pair of antennæ. Eyes large, conspicuous.

First pair of antennæ consist of four joints, the terminal or flagellar joint being fringed with long hairs. The second pair of antennæ are composed of five joints, the terminal joint being fringed with hairs.

The first three thoracic segments are about equal in length. The fourth and fifth segments are each much longer than any of the three preceding segments, and are about alike in size. The sixth segment is short, not quite as long as any one of the first three segments. The seventh is very short, being one-third the length of the sixth segment, and in both specimens examined is devoid of legs.

The segments of the abdomen are distinct, the first five together not being as long as the sixth thoracic segment. The last thoracic segment is abruptly narrower than the sixth, and is likewise somewhat narrower than the abdominal segments.

The terminal segment of the body is linguiform, the posterior margin evenly rounded and smooth. The inner branch of the uropoda is likewise rounded posteriorly with a smooth margin. The outer and superior branch arches over the telson. Both branches, as well as the terminal abdominal segment, are fringed with hairs.

The first pair of legs are subcheliform, the propodus unarmed. The second and third pairs are also subcheliform, but smaller, with the propodus armed on the posterior margin with five spines. The three following pairs of legs are ambulatory in character. The seventh pair are wanting.

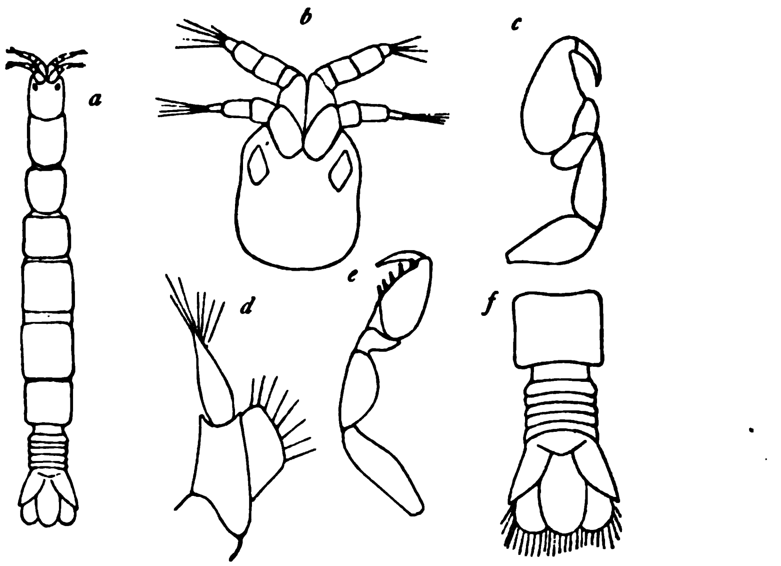

Fig. 64.—Colanthura tenuis. *a*, General figure. *b*, Head and antennæ. *c*, Leg of first pair. *d*, Lateral view of uropoda. *e*, Leg of second pair. *f*, Abdomen and last two thoracic segments.

Two specimens were collected by Prof. A. E. Verrill and party at the Bermudas in 1898. Both specimens are adult females, the marsupium in one being very large and extending the entire length of the thorax, from the second segment.

Type specimen in Peabody Museum, Yale University. Cat. No. 3252.

Family V. CIROLANIDÆ.[a]

Body more or less semicylindrical in form. Epimera well defined on all the segments of the thorax, with the exception of the first. Abdomen usually composed of six distinct segments. Uropoda lateral, and forming, with the last segment of the abdomen, a caudal fan. Eyes usually small, lateral. Antennæ usually unequal in length, multiarticulate, with well-defined peduncle and flagellum. First three pairs of legs usually prehensile; last four pairs ambulatory. Pleopods well developed and adapted for swimming and breathing. Second pair of pleopods in the male with a stylet inside the inner plate. Incubatory pouch composed of five pairs of plates issuing from the bases of the first five pairs of legs.

Labrum large, two or three times wider than long.

Clypeus large, wide, short, triangular.

Mandibles wide throughout their entire length; the posterior part seen in position turned a little inward; the distal part directed inward, wide, but long, and covered for the most part; cutting part long, more or less trifid, the posterior apex always larger than the other apices; the movable lacinia is large, furnished with many spines; the molar part is elongate, triangular, furnished with triangular processes on the anterior margin.

The first pair of maxillæ are robust: the lacinia of the first article is inflated at the apex and furnished with three plumose processes; the lacinia of the third article is wide or very wide at the apex and is furnished with many robust spines.

The second maxillæ are well developed; the lacinia of the second article is wide, free, and short, and furnished with many setæ; the laciniæ of the third and fourth articles are much longer than wide, with the inner margin furnished with long setæ.

The maxillipeds are well developed; the margins of the articles of the palp are furnished with many setæ, but never furnished with hooks.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY CIROLANIDÆ.

a. All six segments of abdomen distinct, not coalesced.
  b. No branchiæ developed at base of pleopoda. Eyes, when present, placed on superior and inferior side of head.
    c. Peduncle of the second pair of antennæ composed of five articles. Plate of the second joint of the maxillipeds furnished with hooks. First pair of antennæ with basal article of peduncle not placed at right angles to second article.
      d. First three pairs of legs prehensile. Last four pairs ambulatory. Uropoda with the inner angle of the peduncle produced.

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[a] See Sars, Crust. of Norway, II, 1899, pp. 67–68, for characters of family. Also Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 310–311, 317, 318.

e. **First and second pair of pleopods similar to each other, the inner branch being submembranaceous; the peduncle of the second pair of pleopods is somewhat wider than long** ....Genus *Cirolana* Leach

e'. **First and second pairs of pleopods not similar to each other; first pair of pleopods with both branches hard, and forming a large operculum. Second pleopods of the usual structure; the peduncle of the second pleopods is scarcely wider than long** ....Genus *Conilera* Leach

d'. **Only first pair of legs prehensile. The six following pairs are ambulatory. Uropoda with the inner angle of the peduncle not produced. Eyes wanting** ....Genus *Cirolanides* Benedict

c'. **Peduncle of the second pair of antennæ composed of four articles. Plate of the second article of the maxillipeds not furnished with hooks. First pair of antennæ with basal article of peduncle extended straight in front at a right angle to the remaining part of the antennæ.**

d. **Maxillipeds normal, composed of seven articles. Uropods not attached to underside of abdomen and not branchial in function.**
Genus *Eurydice* Leach

d'. **Maxillipeds composed of two articles. Uropoda attached to the underside of abdomen, and branchial in function, being similar to the pleopods** ....Genus *Branchuropus* Moore

b'. **Supplementary ramified branchiæ developed at the base of the inner branches of the pleopoda. Eyes placed entirely on inferior side of head.**
Genus *Bathynomus* A. Milne Edwards

a'. **Five anterior segments of abdomen fused to form a single segment anterior to large terminal segment** ....Genus *Colopisthus* Richardson

19. Genus CIROLANA Leach.

First pair of antennæ with basal article of peduncle not extended straight in front at right angles to second article. Peduncle of the second pair of antennæ composed of five articles.[a]

The plate of the second article of the maxillipeds furnished with hooks.

Abdomen with all six segments distinct.

The first and second pairs of pleopods similar to each other, the inner branch being submembranaceous; the peduncle of the second pair of pleopods is somewhat wider than long.

The peduncle of the uropoda has the inner angle strongly produced.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CIROLANA.

a. **Eyes present.**

b. **Fifth abdominal segment with lateral angles free, not covered by the fourth segment.**

c. **Body short. Sides of head angulated. First pair of antennæ short, reaching only to the posterior margin of the head. Frontal lamina forming a large rounded projection, extending beyond the apex of the head and separate from the frontal process. Inner branch of uropoda much longer than outer branch. Terminal abdominal segment tricarinated.**
Cirolana sphæromiformis Hansen

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[a] Hansen recently states that in three species of *Cirolana* the peduncle of the second pair of antennæ is composed of six articles, *C. borealis* being one of these.

c′. Body oblong, ovate. Sides of head rounded. First pair of antennæ long, reaching to or beyond the posterior margin of the first thoracic segment. Head produced in front in a process continuous with frontal lamina. Inner branch of uropoda not longer than outer branch. Terminal abdominal segment not tricarinated.

d. First pair of antennæ extend to the posterior margin of the first thoracic segment. Second pair of antennæ extend to the posterior margin of the third thoracic segment, and are provided with a brush-like structure on flagellum. Inner branch of uropoda shorter than outer branch. Terminal abdominal segment smooth.................... *Cirolana mayana* Ives

d′. First pair of antennæ extend to the posterior margin of the third thoracic segment. Second pair of antennæ extend to the posterior margin of the fifth thoracic segment, and are not provided with brush-like structure on flagellum. Branches of uropoda of equal length. Terminal abdominal segment with basal portion raised above posterior portion, with well-defined edge separating the two parts.

e. First pair of antennæ with joints of peduncle subequal. Terminal abdominal segment posteriorly rounded. Basal portion of terminal abdominal segment with median lobe produced in two points, one on either side of the median line.................. *Cirolana linguifrons* Richardson

e′. First pair of antennæ with first article longer than second, and third article twice as long as second. Terminal abdominal segment posteriorly triangular, with apex acute. Basal portion of terminal abdominal segment with median lobe truncate... *Cirolana chiltoni*, new species

b. Fifth abdominal segment with lateral parts covered by the fourth segment.

c. Frontal lamina posteriorly or clypeus anteriorly produced horn-like, especially so when seen from the side.................. *Cirolana minuta* Hansen

c′. Frontal lamina and clypeus unarmed, not produced horn-like; anterior margin of the clypeus manifestly united with the frontal lamina.

d. Frontal lamina narrow, elongate, from four to six times longer than broad.

e. Extremity of exterior margin of inner branch of the uropoda emarginate.

f. Terminal segment of abdomen emarginate at its extremity.
Cirolana concharum (Stimpson)

f′. Terminal segment of abdomen not emarginate at its extremity, posterior margin entire.

g. Second pair of antennæ, with flagellum composed of twenty articles, extend to the posterior margin of the second thoracic segment. Terminal segment of abdomen furnished with spines. Outer branch of uropoda extends about six-sevenths of the length of the inner branch. Inner branch of uropoda, below emargination, is wide, posteriorly truncate or slightly emarginate. Epimera with impressed lines.......................... *Cirolana impressa* Harger

g′. Second pair of antennæ, with flagellum composed of ten articles, extend to the middle of the first thoracic segment. Terminal segment of abdomen not furnished with spines. Outer branch of uropoda extends about three-fourths of the length of the inner branch. Inner branch of uropoda below emargination is narrow and posteriorly pointed. Epimera without impressed lines.
Cirolana polita (Stimpson)

e′. Extremity of exterior margin of the inner branch of the uropoda not emarginate.

f. Eyes small, black, longer than wide. Branches of uropoda narrow, lanceolate, somewhat elongated; inner branch almost three times longer than wide. Clypeus even. Terminal segment posteriorly rounded.
Cirolana borealis Lilljeborg

f'. Eyes large, brown, as long as wide. Branches of uropoda short; inner branch hardly twice as long as wide. Clypeus with margin raised all around and with a median rib, surrounding two impressed areas. Terminal segment truncated obliquely with apex acute. *Cirolana gracilis* Hansen

d'. Frontal lamina broad, short, scarcely twice as long as wide.

e. Terminal segment truncate .... *Cirolana obtruncata* Richardson

e'. Terminal segment not truncate, rounded.

f. Posterior margin of terminal abdominal segment armed with numerous (twenty-six) robust spines. Inner branch of uropoda with outer postlateral angle rounded .... *Cirolana harfordi* (Lockington)

f'. Posterior margin of terminal abdominal segment armed with a few (about eight) small spines. Inner branch of uropoda with outer postlateral angle acute.

g. Body two and two-thirds times longer than wide. Second pair of antennæ extend to posterior margin of the fourth thoracic segment. Color light brown .... *Cirolana parva* Hansen

g'. Body three and two-thirds times longer than wide. Second pair of antennæ extend to the posterior margin of the third thoracic segment. Color white .... *Cirolana albida* Richardson

a'. Eyes wanting .... *Cirolana cubensis* Hay

CIROLANA SPHÆROMIFORMIS Hansen.

Cirolana sphæromiformis Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 351–353, pl. IV, figs. 3–3g.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 512.

Locality.—St. Thomas, West Indies.

Body short, subovate, twice as long as wide, rather convex.

Head forming at the sides a prominent angle, produced in front in a rather narrow but long frontal process, the margin between the lateral angle and the base of the frontal process being rather straight, forming a manifest carina on the surface of the head.

Eyes very small, appearing only on the superior margin of the head in an angulated process, formed of a few, rather convex ocelli.

The frontal lamina is exceedingly narrow at the basal part, is partly concealed under the end of the clypeus, becomes exceedingly dilated toward the apex, which is inflated and widely rounded, and later somewhat overhangs the frontal process and becomes united with that process.

The clypeus is very short, produced at the base in a very short, acute point. The first pair of antennæ are somewhat shorter than the peduncle of the second pair of antennæ; the peduncle is twice as long as the flagellum, and composed of three articles, the basal article being short; the flagellum is composed of about four articles, with the basal article elongate, the last three articles being very minute.

The second pair of antennæ extend a little beyond the posterior margin of the second thoracic segment; the peduncle is stout, with the fourth article much longer than the third article and somewhat shorter than the fifth article; the flagellum is composed of about twelve articles.

The mandibles have a wide cutting edge. The maxillipeds are almost as in *C. japonica*.

The segments of the thorax are subequal in length; the first segment is somewhat shorter than the head and somewhat longer than the fifth segment; the sixth and seven segments are subequal in length and ornamented near the anterior margin with a transverse furrow. The epimera are large, posteriorly produced, and obliquely carinated (the carina terminating in a fork, very wide particularly in the posterior epimera, and very deep, forming an excavation), becoming gradually wider posteriorly and more produced, the carina becoming higher and the posterior angle subacute; the epimera of the seventh pair extend in length as far as the first four segments of the abdomen.

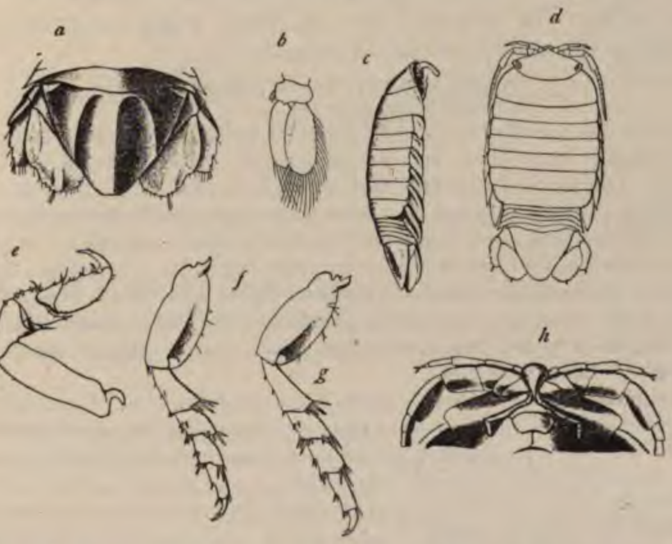

FIG. 65.—CIROLANA SPHÆROMIFORMIS (AFTER HANSEN). *a*, POSTERIOR PART OF ABDOMEN. *b*, LEFT PLEOPOD OF SECOND PAIR. *c*; LATERAL VIEW OF FEMALE. *d*, DORSAL VIEW OF FEMALE. *e*, LEG OF SECOND PAIR. *f*, LEG OF FIFTH PAIR. *g*, LEG OF SEVENTH PAIR. *h*, ANTERIOR PART OF HEAD. (ENLARGED.)

The first three pairs of legs are rather robust, with the second article elongate, the fourth article very short with the exterior angle reaching beyond the apex of the fifth article; the legs of the second and third pairs have the sixth article much wider than in other species, long, about twice as long as wide.

The last four pairs of legs are short, rather robust; the sixth and seventh pairs of legs are subequal in length, the fifth pair of legs being a little longer.

The first five segments of the abdomen are exposed, are very short and very convex; the fifth segment has the lateral angles not covered by the fourth segment.

The anterior pairs of pleopods are furnished with long hairs.

The last segment of the abdomen is somewhat wider than long, subtriangular, with apex rather short, truncate, not furnished with spines, very convex, the dorsal surface being tricarinated and deeply and equally excavate between the carinæ; the two lateral carinæ are a little divergent posteriorly, and a little arcuate.

The uropoda are short, wide, and do not extend beyond the abdomen. The inner branch is more than twice as long as wide; the exterior margin is strongly curved, and somewhat angulate a little before the median line; the distal part is irregularly serrate, not furnished with spines; the posterior part of the inner margin is also strongly curved, almost angulate, and furnished with a few very short hairs; the apex forms a very obtuse angle, and is furnished with a few long hairs. The outer branch is much shorter than the inner branch, and similar in form to it. The peduncle has the inner angle not produced, and not reaching the middle of the inner branch.

The color is a brownish yellow, somewhat grayish.[a]

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[a] The above description is adapted from the following description of Hansen's:

Diagn. Corpus breve, duplo longius quam latius. Caput et in lateribus et ante angulatum. Lamina frontalis ante bullam magnam, apicem capitis paulo superantem, formans. Epimera majora, per paria postice plus producta et altius carinata, angulo posteriore subacuto. Segmenta 5 anteriora caudæ perbrevia. Segmentum ultimum caudæ uropoda vix superans, subtrigonum, apice subtruncato, dorso alte tricarinato et inter carinas excavato. Uropoda brevia, lata; ramus uterque margine exteriore valde excurvato ibique fere angulato, parte distali irregulariter inciso-serrata, margine postero-interiore valde excurvato; ramus interior ramo exteriore multo longior.—Long. 4, 25 mm.

Corpus subovatum, duplo longius quam latius, sat convexum. Caput in lateribus angulum prominulum formans, ante in processum frontalem angustiorem sat longum productum, margine inter angulum lateralem et basin processus frontalis subrecto, in superficie capitis carinam manifestam formante.

Oculi minuti, solum in latere superiore capitis in processu angulato inventi, ex ocellis paucis, sat convexis formati.

Lamina frontalis parte basali valde angustata, ex parte sub cornu clypei obtecta, ad apicem versus valde dilatata, alte prominens, parte apicali inflata, ante late rotundata, ultra processum frontalem nonnihil prominente et cum hoc processu conjuncta.

Clypeus perbrevis, a basi in cornu brevius, acutum productus.

Antennulæ pedunculo antennarum aliquanto breviores; pedunculus flagello duplo longior, 3-articulatus, articulo basali brevi; flagellum c. 4-articulatum, articulo basali elongato, articulis 3 ultimis perminutis.

Antennæ paulo ultra marginem posteriorem segmenti secundi trunci prominentes; pedunculus crassior, articulo quarto multo longiore quam articulo tertio et nonnihil breviore quam articulo quinto; flagellum c. 12-articulatum. Mandibulæ acie latiore. Maxillipedes fere ut in *C. japonica.*

Segmenta trunci longitudine minus inæqualia; segmentum primum capite nonnihil brevius et segmento quinto nonnihil longius; segmenta sextum et septimum longitudine subæqualia, stria transversa prope marginem anteriorem ornata. Epimera majora, postice producta, in obliquum carinata (carina furca imprimis in epimeris posterioribus latissima et profundissima, excavationem formante, definita), postice

CIROLANA MAYANA Ives.

Cirolana mayana Ives, Proc. Acad. Nat. Sci. Phil., 1891, pp. 186–187, pl. vi, figs. 3–10.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 512.—Moore, Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 166, pl. viii, figs. 1–5.

Localities.—Coast of Yucatan; Santa Marta, United States of Colombia; Boqueron Bay and Culebra, Porto Rico; Brandon's, Barbados Beach; San Francisco Bay, Lower California.

A large number of dried specimens from San Francisco Bay, Lower California, sent to me by Doctor Ritter, of the University of California, agree so perfectly with the specimens in the U. S. National Museum from localities above cited that I have not been able to separate them.

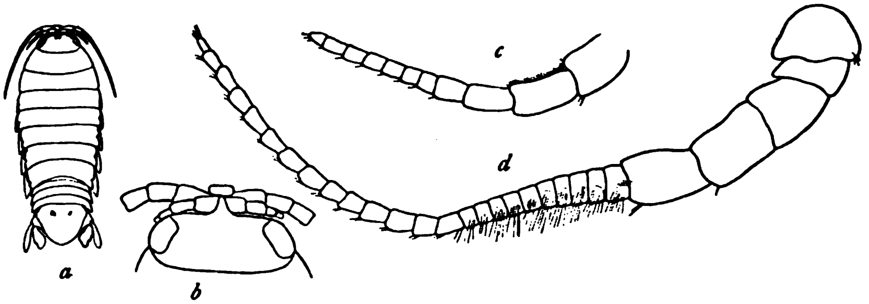

Fig. 66.—Cirolana mayana (after Moore). *a*, General figure. *b*, Head. *c*, First antenna. *d*, Second antenna.

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per paria latiora, plus producta, altius carinata, angulo posteriore subacuto; epimera septimi paris segmenta quattuor anteriora caudæ longitudine explentia.

Pedes trium parium anteriorum sat robusti, articulo secundo elongato, quarto brevissimo angulo exteriore ultra apicem articuli quinti prominente; pedes secundi et tertii parium articulo sexto multo latiore quam in speciebus ceteris, longo, duplo longiore quam latiore.

Pedes parium quattuor posteriorum breves, sat robusti; pedes sexti et septimi parium inter se subæque longi, pedibus quinti paris paulo longiores.

Segmenta quinque anteriora caudæ detecta, brevissima, alte convexa; segmentum quintum angulis lateralibus non a segmento quarto tectis.

Pleopoda parium anteriorum setis longis instructa.

Segmentum ultimum caudæ aliquanto latius quam longius, subtrigonum, apice brevius, subrecte truncato, non spinoso, alte convexum, dorso alte tricarinato et inter carinas profunde et æqualiter excavato; carinæ duæ laterales postice paulum divergentes, paulum arcuatæ.

Uropoda brevia, lata, caudam non superantia. Ramus interior plus duplo longior quam latior; margo exterior valde excurvatus, paulum ante medium subangulatus, parte distali irregulariter serrata, non spinosa; margo postero-interior interum valde excurvatus, fere angulatus, setis nonnullis brevissimis instructus; apex angulum valde obtusum formans, setis nonnullis longioribus instructus. Ramus exterior ramo interiore multo brevior, huic forma similis. Scapus angulo interiore minus producto, non ad medium ramum interiorem prominente.

Color flavo-brunnescens, nonnihil grisescens.—Hansen, Vidensk. Selsk. Skr., (6), V, 1890, pp. 351–353.

In one specimen examined the maxillipeds consisted each of two articles. This, of course, was an abnormality, as all the other specimens in the collection had maxillipeds composed of the usual number of articles. The genus *Branchuropus* Moore is characterized as having the maxillipeds two-jointed. Only one specimen of the species, *B. littoralis*, was obtained, and it seems as though there might be some question as to its being normal in this respect. The genus *Anuropus* Beddard was also instituted because the type and only specimen had, among other characters, the one of having maxillipeds composed of two articles.

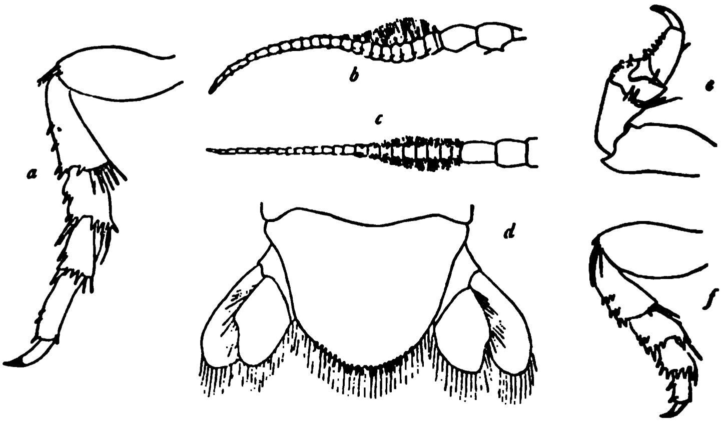

Fig. 67.—Cirolana mayana (After Ives). *a*, Fifth leg (right side). *b*, Dorsal view of right antenna of second pair. *c*, Anterior view of same. *d*, Last segment of abdomen with uropoda. *e*, First leg (right side). *f*, Fourth leg (right side).

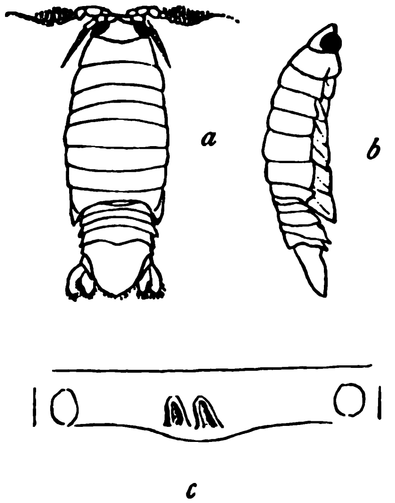

Fig. 68.—Cirolana mayana (After Ives). *a*, Dorsal view. × 4. *b*, Right side. × 4. *c*, Seventh thoracic segment with male appendage.

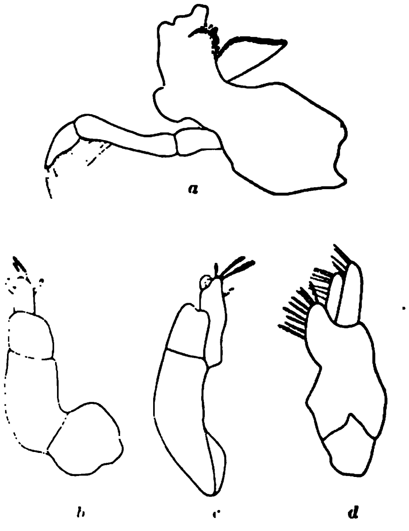

Fig. 69.—Cirolana mayana. *a*, Mandible. × 39. *b*, *c*, Abnormal maxilliped. × 39. *d*, Second maxilla. × 39.

Body oblong-ovate, two and a half times longer than broad, 4 mm.: 10 mm.

Head two and a half times wider than long, 1 mm.: 2½ mm. Front produced in a long median point which separates the basal articles of the first pair of antennæ and meets and is coalesced with the anterior end of the frontal lamina, which arches over the second antennæ and forms a dorsal continuation of the median frontal process extending 1 mm. beyond the frontal margin of the head. The eyes are small, round, composite, and situated in the antero-lateral angles of the head. The first pair of antennæ have the first two articles short and subequal; the third article is half as long and narrower than either of the other two. The flagellum is composed of thirteen articles. The first pair of antennæ extend almost to the posterior margin of the first thoracic segment. The second antennæ have the peduncle apparently composed of only four articles; the first article is short and almost inconspicuous; the second and third articles are subequal; the fourth and fifth are also subequal and each is a little longer than the third. The flagellum is composed of twenty-three articles. The second antennæ extend to the posterior margin of the third thoracic segment. The first nine or ten articles of the flagellum have a tuft of hairs on the outer margin. The interantennal plate or frontal lamina is wide and conspicuous and arches over the second pair of antennæ meeting the anterior end of the frontal process. The clypeus has the anterior end produced over the posterior end of the frontal lamima and extends out from it. Maxilliped composed of seven articles. The mandible has a palp of three articles.

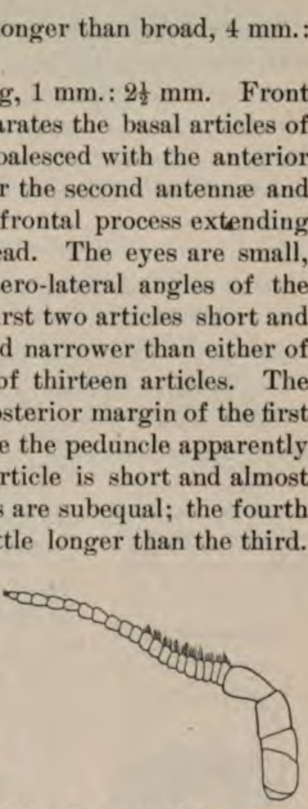

FIG. 70.—CIROLANA MAYANA. SECOND ANTENNA. × 20¼.

The first, fourth, and fifth segments of the thorax are a little longer than any of the others. The epimera of all the segments, with the exception of the first, are distinct. In the second and third segments they are narrow, increasing in width from those of the fourth to the seventh segments. The postero-lateral angles of the last three are acute and produced beyond the posterior margins of the segments. All the epimera are crossed by an oblique carina.

The first segment of the abdomen is almost entirely covered by the seventh thoracic segment. The fifth segment is as wide as the fourth, and is not covered at the sides by the lateral parts of the preceding segment. The sixth or terminal segment is rounded posteriorly. The inner branch of the uropoda is as long as the terminal segment of the body, and is slightly emarginate on its external margin. The outer branch is longer than the inner branch and is rounded posteriorly. The peduncle extends as far as the emargination on the exterior margin of the inner branch. Both branches are beset with spines.

The first three pairs of legs are prehensile. The propodus is armed with four spines, the carpus with three in the first legs, with two in the second and third pairs; the merus with six spines; and the ischium with three or four; the outer distal end of the merus is furnished with one long spine in the first pair of legs. The last four pairs of legs are also furnished with spines.

CIROLANA LINGUIFRONS Richardson.

Cirolana linguifrons Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 823; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 163–164.

Locality.—Monterey Bay, California.

Dug at mean tide mark from sandy shore.

Color, yellow, marked with scattered black dots. Body elongate-ovate, about five times longer than broad, greatly convex.

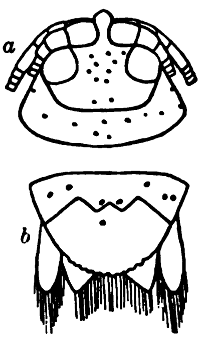

Fig. 71.—Cirolana linguifrons. × 13½. *a*, Head. *b*, Terminal segment.

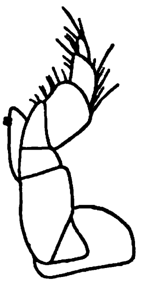

Fig. 72.—Cirolana linguifrons. Maxilliped. × 51⅓.

Head with the frontal margin produced in a long, straight process, rounded anteriorly and somewhat dilated. Eyes large, distinct. First pair of antennæ with the articles of the peduncle large; flagellum of fifteen short joints extends to the posterior margin of the third thoracic segment. Second pair of antennæ, with a flagellum of thirteen long articles, extend to the posterior margin of the fifth thoracic segment.

The first three segments of the thorax are short; the other four segments are long. The epimera of the second, third, and fourth segments ar not produced at the apex; those of the fifth, sixth, and seventh but slightly produced.

All the abdominal segments conspicuous, the first five being of equal length. The fifth segment is as wide as the fourth, and the lateral parts are not covered by the post-lateral angles of the preceding segment. The terminal segment is rounded posteriorly, faintly crenulate and fringed with long hairs. The base of this segment is raised above the other portion and has a well-defined edge with two points extending backward, one on either side of the median line. The uropoda extend beyond the tip of the abdomen; the inner branch is obliquely truncate; the outer branch is more rounded; both branches are fringed with long hairs.

The prehensile legs are short; the ambulatory legs are long and slender. The legs increase gradually in length from the first to the seventh pair.

Two specimens, from Monterey Bay, California, collected by Mr. Heath from sandy shore at mean tide.

Type.—Cat. No. 22564, U.S.N.M.

CIROLANA CHILTONI, new species.

Body oblong-ovate, a little more than twice as long as wide, 5 mm.: 11 mm.

Head wider than long, about twice as wide as long, 1½ mm.: 3 mm. with the front produced in a prominent process which widens anteriorly beyond the antennæ, arches over them and is confluent with the frontal lamina. The eyes are large, composite, and occupy the antero-lateral corners of the head. The first pair of antennæ have the first article large, the second article somewhat shorter, and the third article about one and a half times longer than the second. The peduncle extends to the posterior margin of the head. The flagellum, which is composed of fifteen articles, extends to the posterior margin of the third thoracic segment. The second pair of antennæ have the first two articles extremely short and about equal in length; the third and fourth are subequal and each article is about as long as the first two taken together; the fifth article is twice as long as either of the two preceding articles. The peduncle of the second antennæ extends to the middle of the first thoracic segment. The flagellum is composed of thirteen articles and extends a little beyond the post-lateral angle of the fifth thoracic segment.

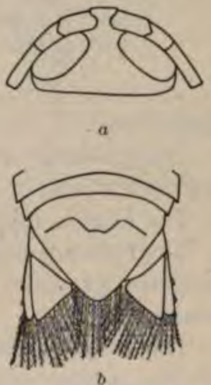

FIG. 73.—CIROLANA CHILTONI. *a*, HEAD. × 9½. *b*, POSTERIOR PART OF ABDOMEN. × 9½.

The seven thoracic segments are subequal in length. Epimera are distinct on the last six segments. The last three have the post-lateral angles slightly produced beyond the posterior margins of the segments.

The first segment of the abdomen is short, being partly covered by the seventh thoracic segment. The second, third, and fourth segments are equal in length and width. The fifth segment is as wide as the preceding segment, and the lateral parts are not covered by the lateral angles of the fourth segment. This segment is a little longer than any of the three preceding segments in the middle of the dorsal surface. The sixth or terminal segment is posteriorly triangular, with apex acute. The inner branch of the uropoda is very broad and obliquely truncate, the outer and inner posterior angles being acute. The outer branch is narrow and posteriorly rounded; it extends to the outer posterior angle of the inner branch. Both branches, as well as the posterior margin of the terminal segment are fringed with long hairs. The base of the terminal abdominal segment is raised above the posterior portion of the segment, and has the posterior edge sharply defined. This carina is in the form of three lobes, two lateral lobes and a median lobe, which is truncate.

The first three pairs of legs are short and prehensile; the four following pairs are ambulatory and densely spinulose.

Two specimens, both females, were collected at San Francisco, California, by Mr. T. G. Cary, jr. They were found in dead *Hippa*. The types are in the Museum of Comparative Zoology, Harvard University. Cat. No. 1621. M. C. Z.

This species is named for Prof. Charles Chilton, the distinguished carcinologist.

CIROLANA MINUTA Hansen.

Cirolana minuta Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 347–348, pl. iii, figs. 5–5d; pl. iv, figs. 1–1f.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 512.—Stebbing, Willey's Zool. Results, 1902, p. 634.

Localities.—St. Thomas, West Indies; also Lifu, Loyalty Islands (Stebbing).

Body oblong-ovate, about two and a third times longer than wide, somewhat convex.

The head is formed almost as in *C. parva*.

The eyes are moderately large, larger than in other species, brownish, almost wider than long, the ocelli rather numerous, somewhat convex.

The frontal lamina is about two and a half times longer than wide, oblong-pentagonal, or almost hexagonal, with the apex anteriorly truncate, the basal part furnished with a moderately large acuminate tubercle. The clypeus is small, much shorter than the labrum.

The first pair of antennæ are somewhat elongate, extending somewhat beyond the peduncle of the second pair of antennæ; the peduncle is a little longer than the flagellum, and is composed of two articles; the flagellum is slender and is composed of seven articles.

The second pair of antennæ do not extend quite to the posterior margin of the fourth thoracic segment; the peduncle is slender, with the fourth article almost twice as long as the third article, and a little shorter than the fifth article; the flagellum is composed of seventeen or eighteen articles.

The mandibles have the cutting edge partly concealed by the labrum, seen at first rather narrow.

The maxillipeds are short, with the fifth article largest, wider than long, somewhat larger than both of the last articles.

The segments of the thorax are almost as in *C. parva*.

The epimera are moderately large, differing a little in size, and furnished with the two usual furcæ; the posterior epimera are a little produced posteriorly, with apex acute.

The legs are slender, with the second article somewhat elongate; the first pair of legs are manifestly stouter than the second pair of legs; the second and third pairs of legs have the fourth article produced on the exterior side to the middle of the fifth article; the fifth and seventh pairs of legs are subequal; the second pair are somewhat longer and the sixth pair a little shorter.

The anterior segments of the abdomen and the pleopoda are almost as in *C. parva*. The last segment of the abdomen is somewhat wider

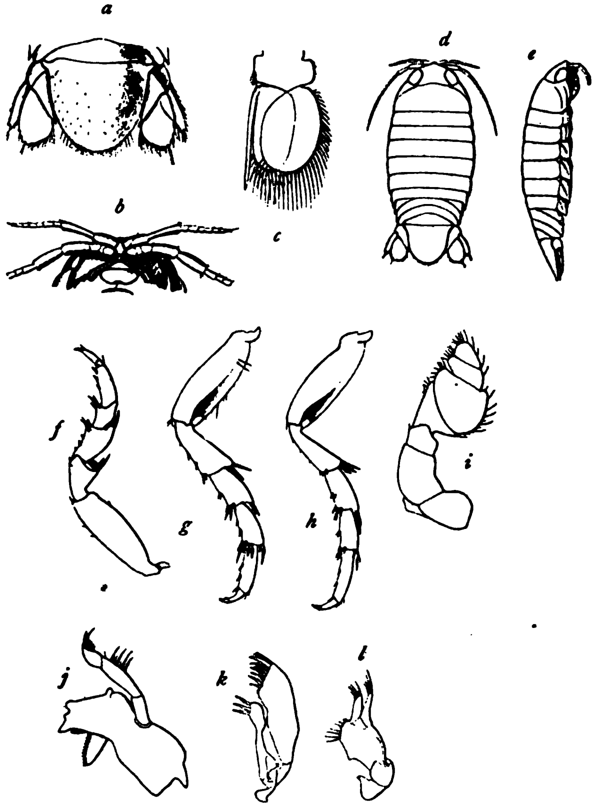

FIG. 74.—CIROLANA MINUTA (AFTER HANSEN). *a*, POSTERIOR PART OF ABDOMEN. *b*, ANTERIOR PART OF HEAD (FROM BELOW). *c*, LEFT PLEOPOD OF SECOND PAIR. *d*, ADULT MALE. *e*, LATERAL VIEW OF SAME. *f*, SECOND LEG. *g*, FIFTH LEG. *h*, SEVENTH LEG. *i*, MAXILLIPED. *j*, MANDIBLE. *k*, FIRST MAXILLA. *l*, SECOND MAXILLA. (ENLARGED.)

than long, extends a very little beyond the uropoda, is a little linguate and evenly convex, with the posterior margin widely rounded and furnished with about eight spines.

The uropoda are short and wide. The inner branch is more than one-half longer than wide; the posterior part of the inner margin is strongly curved, and furnished with plumose cilia and a few spines; the apex forms a right angle, is bifid, and furnished with a f
long simple hairs; the exterior margin is somewhat curved.

outer branch is short, with apex bifid and furnished with long simple hairs. The peduncle has the inner posterior angle reaching a little beyond the middle of the inner branch.

The color of the specimens, preserved for a long time in alcohol, is a pale brown.

The male appendage extends a long distance beyond the inner branch, is narrow, straight, rather compressed, with apex acuminate.[a]

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[a] The above description is adapted from the following one of Hansen's:

Diagn. Corpus oblongo-ovatum. Frons in processum, a fronte visum longiorem, sat angustum nonnihil circumflexum, cum lamina frontali conjunctum, producta. Lamina frontalis fere oblongo-hexagona, parte basali cornu instructa. Antennulæ pedunculo antennarum nonnihil longiores; pedunculus biarticulatus. Antennæ circiter medium truncum attingentes. Epimera mediocria, furcis solitis instructa. Pedes graciliores, simplices. Segmentum ultimum caudæ uropoda perpaulum superans, lingulatum, paulum et æqualiter convexum, margine posteriore late rotundato, spinis c. 8 ornato. Uropoda brevia, lata; ramus interior ramo exteriore multo longior, margine postero-interiore valde excurvato, apice bifido angulum subrecto formante. Long. maris 4, 3 mm., long. feminæ 4, 8 mm.

Corpus oblongo-ovatum, circiter duplo et tertia parte longius quam latius, nonnihil convexum. Frons fere ut in *C. parva* formata.

Oculi mediocres, majores quam in speciebus ceteris, brunnescentes, fere latiores quam longiores, ocellis sat numerosis, nonnihil convexis.

Lamina frontalis circiter duplo et dimidio longior quam latior, oblongo-pentagona vel fere hexagona, apice anteriore truncato, parte basali cornu mediocri, acuminato instructa. Clypeus parvus, labro multo brevior.

Antennulæ nonnihil elongatæ, pedunculum antennarum nonnihil superantes; pedunculus flagello paulo longior, biarticulatus; flagellum gracilius, 7-articulatum.

Antennæ marginem posteriorem segmenti quarti trunci non attingentes; pedunculus gracilior, articulo quarto fere duplo longiore quam articulo tertio, paulo breviore quam articulo quinto; flagellum 17-vel 18-articulatum.

Mandibulæ acie ex parte a labro tecta, primo visu sat angusta. Maxillipedes breves, articulo quinto maximo, latiore quam longiore, aliquanto majore quam articulis ambobus ultimis.

Segmenta trunci fere ut in *C. parva.*

Epimera mediocria, magnitudine paulum inter se discrepantia, furcis binis solitis instructa, epimera posteriora postice paulum producta, apice acuto. Pedes graciliores articulo secundo nonnihil elongato; pedes primi paris pedibus secundi paris manifesto crassiores, pedes secundi et tertii parium articulo quarto in latere exteriore haud ad medium articulum quintum producto; pedes quinti et septimi parium æquilongi, pedibus secundi paris nonnihil longiores et pedibus sexti paris paulo breviores.

Segmenta anteriora caudæ et pleopoda fere ut in *C. parva.* Segmentum ultimum caudæ nonnihil latius quam longius; cetera in diagnosi commemorata.

Uropoda brevia, lata. Ramus interior plus quam dimidio longior quam latior; margo postero-interior valde excurvatus, ciliis mediocribus plumosis et spinis nonnullis instructus; apex angulum subrectum formans, bifidus, setis nonnullis longis, simplicibus instructus; margo exterior aliquantum excurvatus. Ramus exterior brevis, apice bifido, setis longis, simplicibus instructo. Scapus angulo postero-interiore paulum ultra medium ramum interiorem attingente.

Color in speciminibus diu in spiritu vini asservatis pallide brunnescens.

Appendix masculina ramum interiorem longe superans, recta, angusta, sat compressa, apice acuminato, acuto.—HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 347–348.

CIROLANA CONCHARUM (Stimpson).

Æga concharum Stimpson, Smithsonian Contributions to Knowledge, VI, 1853, p. 42.—Lütken, Vidensk. Meddel., 1859, p. 77.

Conilera concharum Harger in Verrill, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 572 (278); p. 459 (165).

Cirolana concharum Harger, Proc. U. S. Nat. Mus., II, 1879, p. 161; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 378–381, pls. IX–X, figs. 58–63; Bull. Mus. Comp. Zool., Harvard College, XI, No. 4, 1883, pl. I, fig. 4; pl. II, figs. 4–4c.—Richardson, American Naturalist, XXXIV, 1900, p. 216; Proc. U. S. Nat. Mus., XXIII, 1901, p. 513.

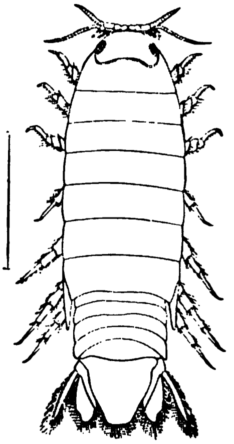

Fig. 75.—Cirolana concharum (after Harger).

Localities.—Currituck, North Carolina; Charleston, South Carolina; Woods Hole, Massachusetts; Amagansett, Long Island; Vineyard Sound; off Fishers Island; off New Shoreham; Block Island; Long Island Sound; Halifax, Nova Scotia.

Depth.—Surface to 18 fathoms; muddy and sandy bottom.

From stomach of skate; under eye of *Pseudotriacis microdon.*

It feeds on the common blue crab. From a single crab as many as 108 specimens have been taken.

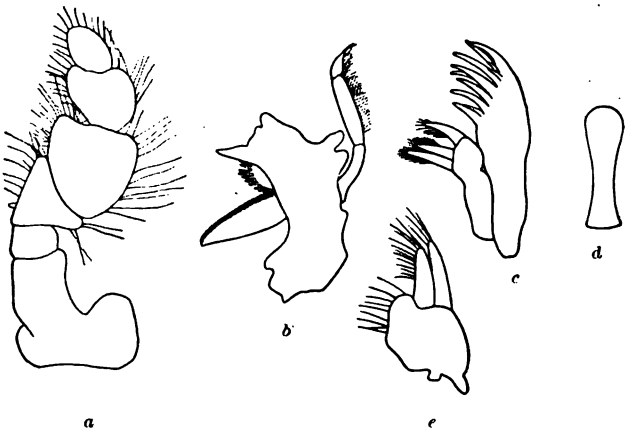

Fig. 76.—Cirolana concharum. *a*, Maxilliped. × 15½. *b*, Mandible. × 15½. *c*, First maxilla. × 15½. *d*, Frontal lamina. × 27½. *c*, Second maxilla. × 15½.

Body oblong-ovate, about three times longer than broad; 8 mm.: 23 mm.

Head wider than long, 3 mm.: 4 mm., with the anterior margin rounded and produced in a small median point. Eyes small, irregular in outline, composed of numerous ocelli, and situated in the antero-lateral angles of the head. The first pair of antennæ have the first two articles short and subequal; the third is as long as the first two taken together. The flagellum is composed of seventeen articles and extends to the antero-lateral angles of the first thoracic segment. The second antennæ have the first two articles short and subequal; the third and fourth are subequal and each is as long as the first and second together; the fifth is a little longer than the fourth. The flagellum is composed of sixteen articles and extends to the posterior margin of the first thoracic segment. The maxillipeds are composed of seven articles. The palp of the mandibles is composed of three articles.

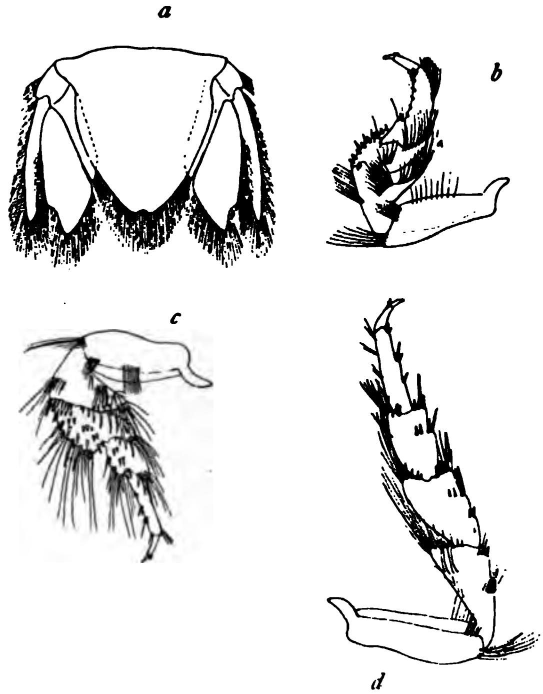

FIG. 77.—CIROLANA CONCHARUM (AFTER HARGER). *a*, LAST SEGMENT OF ABDOMEN WITH UROPODA. × 6. *b*, LEG OF FIRST PAIR. × 8. *c*, LEG OF FOURTH PAIR. × 8. *d*, LEG OF SEVENTH PAIR. × 8.

The first, fourth, fifth, and sixth segments of the thorax are subequal in length, being each 2 mm. long. The second, third, and seventh are subequal and each is 1½ mm. in length. The epimera are distinctly separated from the segments on all but the first segment. In the epimera of the sixth and seventh segments the outer post-lateral angle is acutely produced beyond the posterior margin of the segments.

All six segments of the abdomen are distinct. The last segment is triangular in shape, with the apex notched. The uropods do not extend beyond the extremity of the terminal abdominal segment. Both are of equal length, the outer branch being only one-third as wide as the inner branch. There is a notch on the exterior margin of the inner branch near its posterior extremity. The inner angle of the peduncle of the uropoda is produced and extends two-thirds the length of the terminal abdominal segment.

The first three pairs of legs are prehensile; the last four pairs ambulatory.

CIROLANA IMPRESSA Harger.

Cirolana impressa HARGER, Bull. Mus. Comp. Zool. Harvard College, XI, 1883, No. 4, pp. 93–95, pl. I, figs. 3–3d; pl. II, figs. 3–3c.—VERRILL, Report U. S. Commissioner of Fish and Fisheries, 1885, p. 559, pl. XXXVI, fig. 165.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 216; Proc. U. S. Nat. Mus., XXIII, 1901, p. 513.

Localities.—Latitude 40° 2′ 24″ north, longitude 70° 23′ 40″ west; latitude 40° 3′ north, longitude 70° 31′ west; latitude 39° 57′ north, longitude 69° 47′ west; latitude 39° 55′ 28″ north, longitude 69° 47′ west; Chesapeake Bay; off Cape Hatteras.

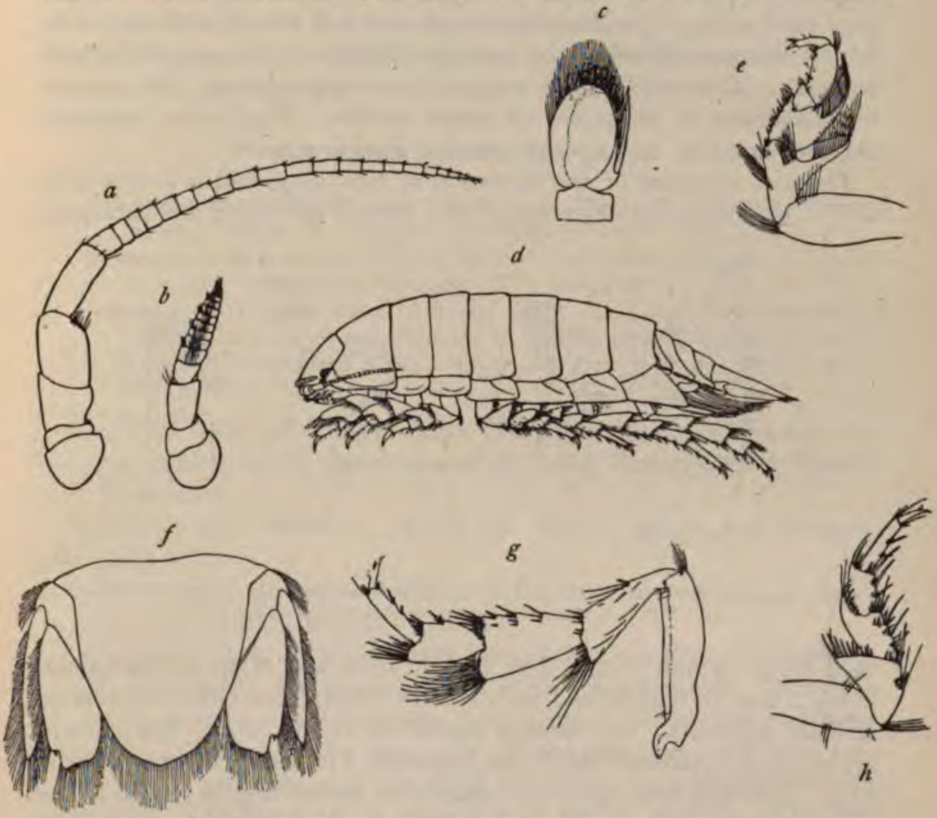

FIG. 78.—CIROLANA IMPRESSA (AFTER HARGER). *a*, SECOND ANTENNA. × 12. *b*, FIRST ANTENNA. × 12. *c*, SECOND PLEOPOD OF MALE. × 8. *d*, LATERAL VIEW OF FEMALE. × 3. *e*, LEG OF FIRST PAIR. × 8. *f*, LAST SEGMENT OF ABDOMEN WITH UROPODA. × 6. *g*, LEG OF SEVENTH PAIR. × 8. *h*, LEG OF FOURTH PAIR. × 8.

Depth.—100–321 fathoms.

Body elongate, almost cylindrical, three and a half times longer than wide, 6 mm.: 21 mm.

Head wider than long, 2½ mm.: 3½ mm., with the anterior margin widely rounded and slightly excavate on either side of a small median point. The eyes are small, composite, and situated in the antero-lateral angles of the head. The first two articles of the first pair of antennæ are short and subequal; the third article is as long as the first two taken together. The flagellum is composed of twelve short articles. The first antennæ extend to the antero-lateral angles of the first thoracic segment or to the end of the peduncle of the second pair of antennæ. The first two articles of the second antennæ are short and subequal; the third and fourth articles are subequal and each is as long as the first two taken together; the fifth is only a little longer than the fourth. The flagellum is composed of twenty articles. The second antennæ extend to the posterior margin of the second thoracic segment. The maxilliped is composed of seven articles. The palp of the mandibles is composed of three articles. The frontal lamina is narrow, elongate, and has the anterior margin rounded.

The first segment of the thorax is 2½ mm. long, and is longer than any of the following segments. The second and third are subequal, each being 1½ mm. long. The fourth, fifth, and sixth are subequal, being 2 mm. in length, and each a little longer than either the second or third segments. The seventh segment is 1½ mm. long. The epimera are distinct, separated on all the segments with the exception of the first. The first four have the outer post-lateral angles rounded; the last two have the outer post-lateral angles acutely produced beyond the posterior margins of the segments. There is a carina on all the epimera.

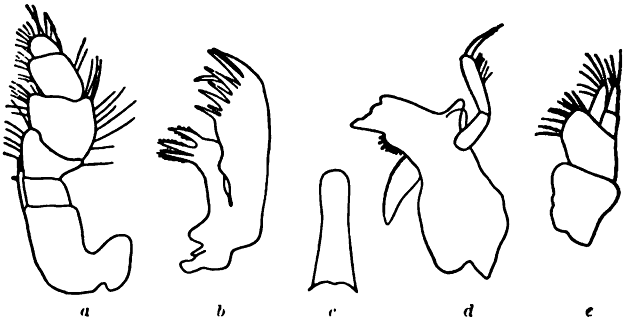

FIG. 79.—CIROLANA IMPRESSA. *a*, MAXILLIPED. × 15¼. *b*, FIRST MAXILLA. × 15¼. *c*, FRONTAL LAMINA. × 27¼. *d*, MANDIBLE. × 15¼. *e*, SECOND MAXILLA. × 15¼.

The first segment of the abdomen is entirely covered by the seventh thoracic segment. The sixth or terminal segment is rounded posteriorly and has the posterior margin crenulate and furnished with spines. The uropoda are as long as the terminal segment. The inner branch is a little longer than the outer branch, is emarginate on the exterior margin near the extremity and has one long spine in the emargination, and four long ones on the posterior margin; the exterior and posterior margins are crenulate. Below the emargination the inner branch is wide and posteriorly truncate or slightly emarginate. The outer branch is about half as wide as the inner branch, and is furnished with one long spine at its posterior extremity. The inner angle of the peduncle extends about two-thirds the length of the terminal segment of the abdomen.

The first three pairs of legs are prehensile, the last four pairs ambulatory. The propodus of the first pair is armed with six spines, the carpus with one, the merus with twelve long ones on the inferior margin and one at the outer distal angle of the exterior margin. In the second and third pairs there are five spines on the propodus, four long ones on the carpus, and nine long ones on the inferior margin of the merus, with one long spine at the outer distal angle on the exterior margin.

CIROLANA POLITA (Stimpson).

Æga polita STIMPSON, Smith. Cont. to Knowl., VI, 1853, p. 41.—LÜTKEN, Vidensk. Meddel., 1859, p. 77.—VERRILL, Am. Jour. Sci. (3), V, 1873, p. 16.

Conilera polita HARGER, in Smith and Harger, Trans. Conn. Acad. Sci., III, 1874, pp. 3, 22.—VERRILL, Am. Jour. Sci., VII, 1874, p. 411.

Cirolana polita HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 161; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 381–382.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 217; Proc. U. S. Nat. Mus., XXIII, 1901, p. 514.

Localities.—Bay of Fundy; Cape Cod Bay; Salem, Massachusetts; Georges Bank; east of Banquereau; off Long Beach, Grand Menan, New Brunswick.

Depth.—1–321 fathoms. Nature of bottom, coarse yellow sand; soft sandy mud.

Body narrow, elongate, about four times as long as wide, 4 mm. : 16 mm.; very convex, almost cylindrical.

The head is a little wider than long, 2 mm. : 3 mm.; its anterior margin is rounded, and produced in a small median point. The eyes are small, square, and composite, and situated in the antero-lateral angles of the head. The first pair of antennæ have the first two articles short and subequal; the third is twice as long as either of the other two. The flagellum is composed of twelve articles. The first pair of antennæ extend to the end of the peduncle of the second pair of antennæ or to the antero-lateral angles of the first thoracic segment. The second antennæ have the first two articles short and subequal; the third and fourth are subequal and each is as long as the first two taken together; the fifth is narrower than the preceding articles, a little more than half as wide, and is a little longer than the fourth. The flagellum is composed of ten articles.[a] The second pair of antennæ extend to the middle of the first thoracic segment. The maxillipeds are composed of seven articles. The mandibles have a palp of three articles. The frontal lamina is small, almost inconspicuous. The terminal lobe of the first article of the maxillæ of the first pair is drawn out into three elongated processes which are fringed with hairs.

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[a] In all the specimens examined.

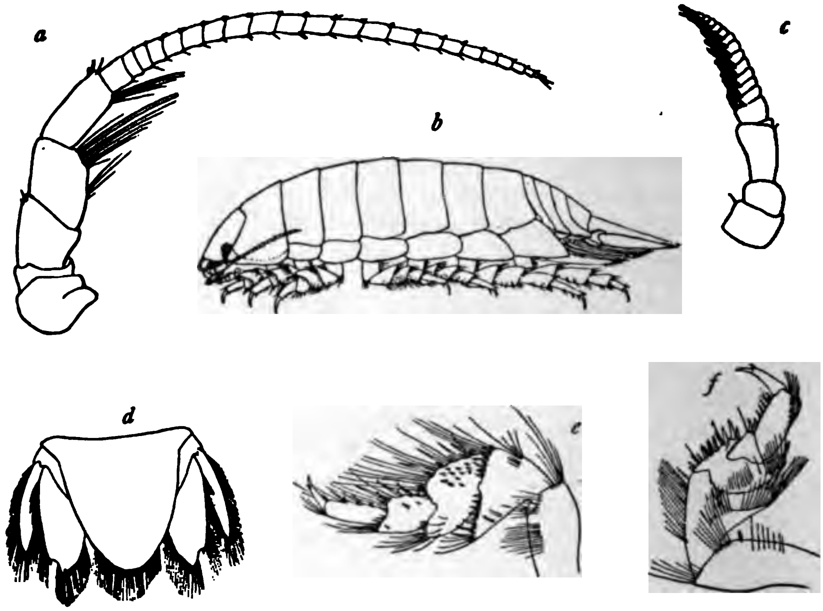

FIG. 80.—CIROLANA POLITA (AFTER HARGER). *a*, SECOND ANTENNA. × 12. *b*, LATERAL VIEW OF FEMALE. × 3. *c*, FIRST ANTENNA. × 12. *d*, LAST SEGMENT OF ABDOMEN WITH UROPODA. × 6. *e*, LEG OF FOURTH PAIR. × 8. *f*, LEG OF FIRST PAIR. × 8.

The fourth, fifth, and sixth segments of the thorax are a little longer than any of the others. The epimera are distinct on all but the first segment. They are narrow, oblong plates with the posterior angles of the last two acutely produced some distance beyond the posterior margin of the segments. All the segments of the abdomen are distinct. The sixth or terminal segment is triangular in shape, with the apex crenulate. The inner branch of the uropoda is as long as the terminal segment of the body and has a slight emargination on the

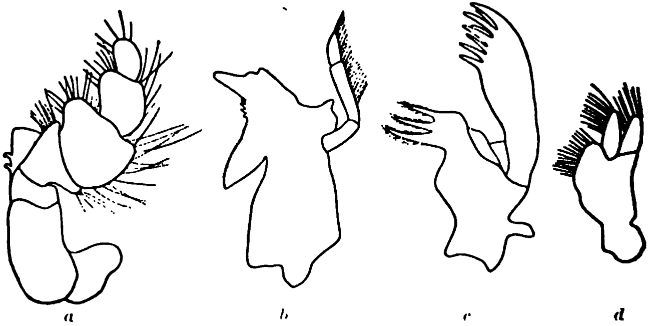

FIG. 81.—CIROLANA POLITA. *a*, MAXILLIPED. × 27½. *b*, MANDIBLE. × 27½. *c*, FIRST MAXILLA. × 27½. *d*, SECOND MAXILLA. × 27½.

exterior margin near the posterior extremity. The exterior margin of this branch is also crenulate above and below the emargination. Below the emargination the inner branch is narrow and posteriorly pointed. The outer branch is half as wide as the inner branch, is acutely pointed, and terminates in a single long spine. It extends as far as the emargination in the exterior margin of the inner branch.

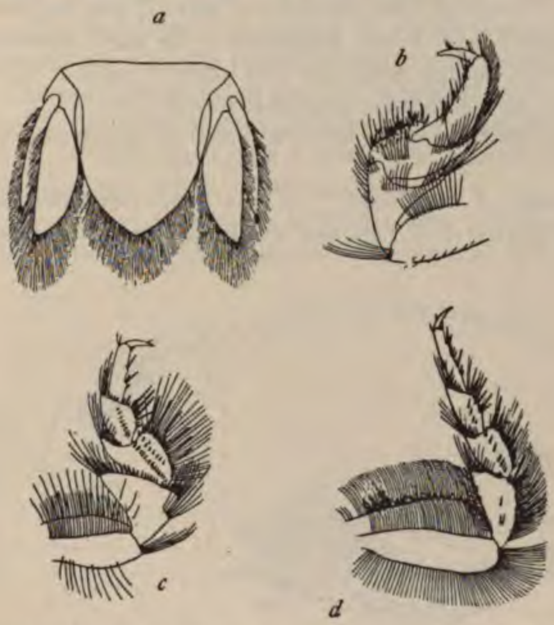

FIG. 82.—CIROLANA BOREALIS (AFTER HARGER) *a*, LAST SEGMENT OF ABDOMEN WITH UROPODA. × 6. *b*, FIRST LEG. × 8. *c*, FOURTH LEG. × 9. *d*, SEVENTH LEG. × 9.

The peduncle of the uropoda extends two-thirds the length of the last abdominal segment.

The first three pairs of legs are prehensile. In these legs the propodus is armed with five spines; the carpus with one spine in the first pair of legs and with three spines in the other two pairs; the merus with ten spines in the last two pairs and with thirteen in the first pair; at the distal extremity of the merus on the exterior side is a single long terminal spine. The last four pairs of legs are ambulatory and are beset with spines.

CIROLANA BOREALIS Lilljeborg.

Cirölana borealis Lilljeborg, Öfvers. Vet. Akad. Förh., 1851, p. 23.

Cirolana spinipes Bate and Westwood, Brit. Sessile-eyed Crustacea, II, 1868, p. 299.—Harger, Bull. Mus. Comp. Zool., Harvard College, XI, No. 4, 1883, pp. 91–93, pl. I, figs. 2–2d; pl. II, figs. 1–1c.

Cirolana borealis Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 321–322, pl figs. 1–1v.—Scott, Ann. Scottish Nat. Hist., 1898, p. 222.—G. O. Sars, C of Norway, II, 1899, pp. 70–71, pl. xxix.—Richardson, American Naturalist, XXXIV, 1900, p. 216; Proc. U. S. Nat. Mus., XXIII, 1901, p. 513.—Ohlin, Bihang till K. Svenska Vet.-Akad. Handl., XXVI, Afd. iv, 1901, No. 12, pp. 23–24.—Dollfus, Bull. Soc. Zool. France, XXVIII, 1903, pp. 5–6.—Norman, Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 437.—Hansen, Journ. Linn. Soc. London, XXIX, 1905, pp. 342–343.

Localities.—Off Cape Florida; Atlantic coast of North America; also British Isles; Shetland Isles; northern part of the western coast of France; latitude 61° 16′ north, longitude 1° 18′ east; Mediterranean at Villefranche and Naples; southern and western coast of Norway; Kattegat; latitude 64° 48′ north, longitude 6° 32′ east.

Depth.—30–300 fathoms; 140 m. to 1,210 m. (Dollfus); 808 fathoms (Norman).

Stebbing[a] says of this form: "It is a good swimmer, tenacious of life, a savage devourer of fish, and not to be held in the human hand with impunity."

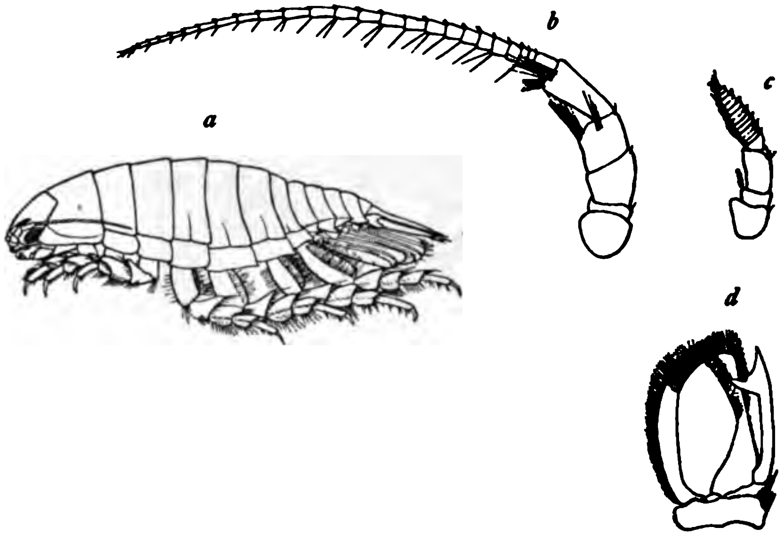

Fig. 83.—Cirolana borealis (after Harger). *a*, Lateral view. × 3. *b*, Second antenna. × 10. *c*, First antenna. × 10. *d*, Pleopod of second pair of male. × 8.

According to Sars, *C. borealis* is "one of the most effective scavengers of the sea, excelling in this respect even the most voracious species of *Anonyx* among the amphipoda."[b]

Body oblong-ovate, almost two and a half times longer than broad, 5 mm.:12 mm., very convex.

Head wider than long, 2 mm.:3 mm., with the anterior margin widely rounded and produced in a small median point. Eyes small, round, composite, and placed in the antero-lateral angles of the head. The first pair of antennæ have the first two articles short, the second

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[a] Hist. of Crustacea, 1893, p. 343.

[b] Crust. of Norway, II, 1899, p. 71.

a little shorter than the first; the third is equal in length to the first two taken together. The flagellum is composed of twelve articles. The first antennæ extend to the end of the fourth article of the peduncle of the second antennæ. The first two articles of the second pair of antennæ are short; the second is shorter than the first; the third and fourth articles are about equal in length and each is as long as the first two taken together; the fifth article is one and a half times longer than the fourth. The flagellum is composed of twenty-four articles. The second antennæ extend to the posterior margin of the second thoracic segment. The maxilliped is composed of seven articles. The palp of the mandible is composed of three articles. The frontal lamina is narrow and elongate, with the anterior end rounded and more flattened than the posterior end, which is attenuated.

The first segment of the thorax is longer than any of those following. The seventh segment is shorter than any of the others. The epimera are distinct on all the segments with the exception of the first. They are broad plates, the last four being wider than the first two and crossed obliquely by a carina. The outer post-lateral angles of the last three are produced beyond the posterior margin of the segment and are more acute than in the first three.

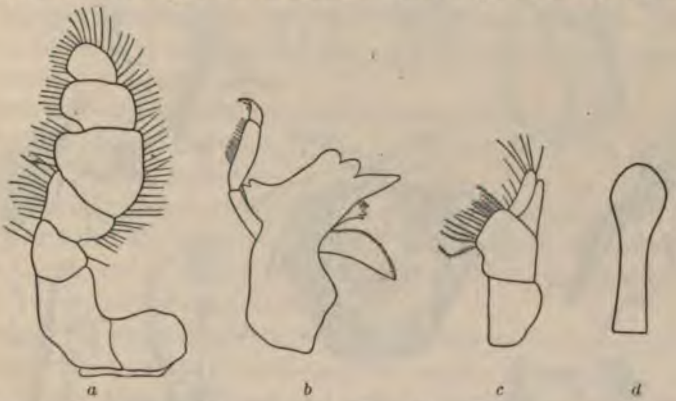

FIG. 84.—CIROLANA BOREALIS. *a*, MAXILLIPED. × 27½. *b*, MANDIBLE. × 27½. *c*, SECOND MAXILLA. × 27½. *d*, FRONTAL LAMINA. × 51⅓.

The first segment of the abdomen is partly concealed by the last thoracic segment. The sixth or terminal segment becomes narrower to a rounded extremity, which is crenulate and furnished with ten spines. The inner branch of the uropoda is wide and extends somewhat beyond the extremity of the last abdominal segment. Its outer post-lateral angle is slightly produced. The outer branch is half as wide as the inner branch, is a little shorter, and is produced to a pointed extremity. The margins of both branches are crenulate and armed with spines. The peduncle extends about two-thirds the length of the terminal abdominal segment.

The first three pairs of legs are prehensile and have the propodus in the first pair armed with five spines, the carpus with one and the merus with eleven long spines and many short ones on the inferior margin, and one long one at the outer distal angle, and the ischium armed with one spine. In the second and third pairs the propodus is armed with two spines, the carpus with three long spines and five short ones, the merus with six long spines and three short ones on the inner margin and three long ones at the outer distal end, and the ischium with three spines. The last four pairs of legs are ambulatory and furnished with numerous spines.

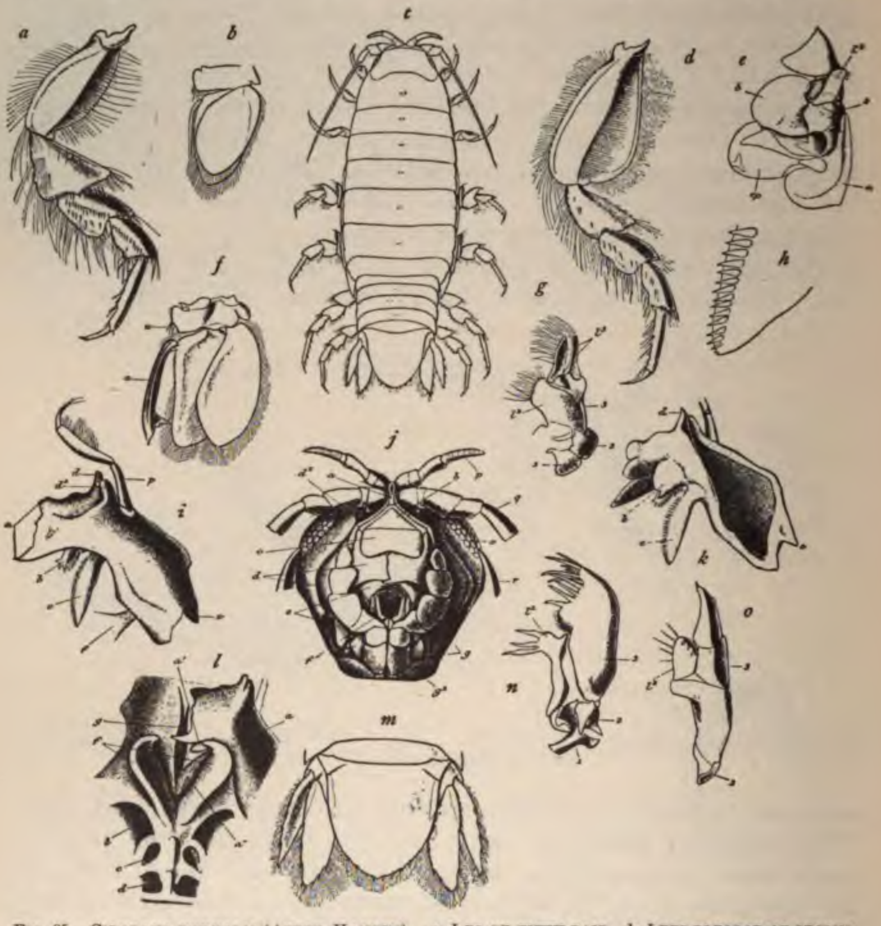

Fig. 85.—Cirolana borealis (After Hansen). *a*, Leg of fifth pair. *b*, Left pleopod of second pair of young male. *c*, Dorsal view of male. *d*, Leg of seventh pair. *e*, Three basal articles of left maxilliped of female. *f*, Left pleopod of second pair of adult male. *g*, Left maxilla of second pair of male. *h*, Distal part of molar process of mandible. *i*, Mandible (left side). *j*, Head of male (ventral view). *k*, Mandible (right side). *l*, Middle part of head, right mandible, maxillæ and maxillipeds omitted. *m*, Posterior part of abdomen of male. *n*, Left maxilla of first pair. *o*, Basal part of left maxilliped. (Enlarged.)

CIROLANA GRACILIS Hansen.

Cirolana gracilis HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 329–331, pl. II, figs. 2–2g.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 513.

Locality.—St. Thomas, West Indies.

Body more than three times longer than wide, somewhat convex.

Front produced forward in a process a little wider and shorter than in *C. borealis.*

Eyes large, brownish, seen from the side almost as wide as long, with the superior margin short and straight; the ocelli are few and large, rather convex on the superior side, somewhat convex on the inferior side.

The frontal lamina is very narrow, becoming narrower toward the apex, with the lateral margins disappearing anteriorly but manifest posteriorly.

The clypeus is scarcely shorter than the labrum with the anterior, posterior, and lateral margins elevated and with a median rib, enclosing two impressed, reticulate areas.

The first pair of antennæ are a little stouter than in *C. borealis*, and extend a little beyond the apex of the fourth article of the penduncle of the second pair of antennæ.

The second pair of antennæ reach the posterior margin of the fourth thoracic segment; the peduncle has the third article scarcely longer than the fourth, and a little shorter than the fifth; the flagellum is composed of about twenty-six articles.

The mandibles and the maxillipeds are almost as in *C. borealis.*

The thoracic segments are subequal in length; the first segment is scarcely shorter than the head and a little longer than the fifth segment; the seventh segment is rather long.

The epimera are a little narrower than in *C. neglecta*, otherwise formed as in that species with furcæ.

The first three pairs of legs are formed almost as in *C. borealis*, nevertheless they are somewhat more slender and furnished with a few hairs and a few spines mostly longer.

The last four pairs of legs are more slender than in *C. borealis*, and are rather different from them. The fifth pair of legs are elongated, are somewhat longer than the seventh pair of legs, and a little shorter than the sixth pair of legs; the second article is formed as in *C. borealis* with simple hairs arranged in three series; the other articles are somewhat more slender than in *C. borealis* and ornamented with hairs and a few spines; the fourth article is rather dilated; the fifth article is quite dilated and furnished everywhere on the superior side with a few spines. The fourth pair of legs are rather short. The seventh pair of legs are rather different; the second article is flattened and very much elongated, about two and a half times longer than wide, with the exterior margin thickly furnished with plumose hairs, the middle margin furnished with a few simple hairs, the interior margin bare, the apical margin furnished with numerous very long, plumose hairs; the other articles are simple, scarcely dilated, shorter, and furnished with very few hairs. The sixth pair of legs differ but little from the fifth pair of legs.

The first five segments of the abdomen and the pleopods have the usual structure.

The last segment of the abdomen is more than a half wider than long, having in the middle near the base a transverse depression, the margins posteriorly being obliquely truncate and ornamented with about eight spines and long hairs, the apex acute.

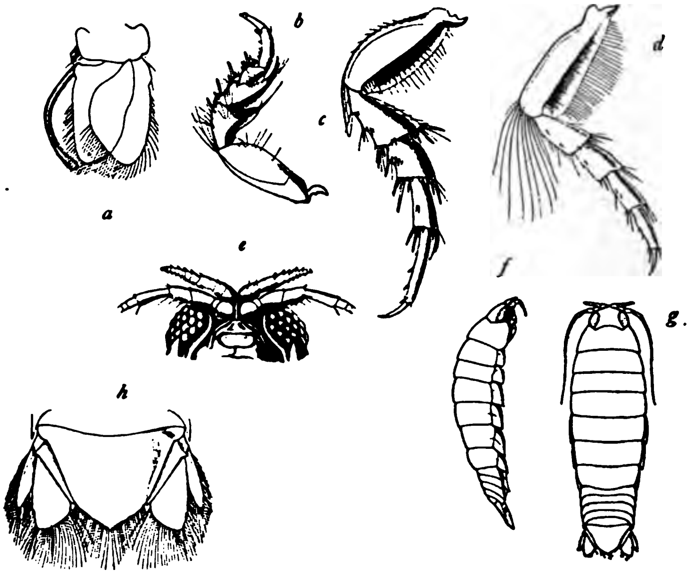

FIG. 86.—CIROLANA GRACILIS (AFTER HANSEN). *a*, LEFT PLEOPOD OF SECOND PAIR. *b*, LEG OF SECOND PAIR. *c*, LEG OF SEVENTH PAIR. *d*, LEG OF FIFTH PAIR. *e*, ANTERIOR PART OF HEAD. *f*, LATERAL VIEW OF MALE. *g*, DORSAL VIEW OF ADULT MALE. *h*, POSTERIOR PART OF ABDOMEN. (ENLARGED.)

The uropoda are rather short; the inner branch is scarcely twice as long as wide, extending somewhat beyond the abdomen, being a little longer than the exterior branch and much narrower, with the posterior margin much shorter than the anterior margin, the apex scarcely acute; both branches are furnished with a few small spines and hairs, mostly long, and longer than in the preceding species (*C. neglecta*); the peduncle has the inner angle strongly produced, extending a long distance beyond the middle of the inner branch.

The color of an old specimen is yellowish brown.

The male appendage is long, curved almost like a semicircle, extending beyond the apex of the inner branch, almost of equal width and thickness throughout, with apex rounded.[a]

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[a] The above description is adapted from the following one of Hansen's:

Diagn. Oculi brunnescentes, a latere visi fere æque lati ac longi, ocellis paucioribus, superioribus sat convexis, inferioribus aliquantum convexis. Clypeus ad medium area biimpressa et pulchre sculpta ornatus. Epimera omnia furca arcuata, manifesta et furca marginali ornata. Pedes quinti paris pedibus septimi paris nonnihil longiores, graciliores, articulo secundo circiter duplo longiore quam latiore. Pedes septimi paris graciliores, articulo secundo valde elongato et complanato circiter duplo et dimidio longiore quam latiore. Segmentum ultimum caudæ postice marginibus valde in obliquum truncatis, spinis c. 8 ornatis, apice acuto. Uropoda ramis valde inæqualibus; ramus interior haud duplo longior quam latior, caudam nonnihil superans, ramo exteriore parvo et angusto multo longior. Long. specim. sing. 8 mm.

Corpus plus triplo longius quam latius, aliquantum convexum. Frons prona in processum, paulo latiorem et breviorem quam in *C. boreali*, producta.

Oculi majores, brunnescentes, a latere visi fere æque lati ac longi, margine superiore breviore, recto; ocelli pauciores et majores, in latere superiore satis convexi, in latere inferiore aliquantum convexi.

Lamina frontalis angustissima, ad apicem versus angustata, marginibus lateralibus ante evanidis, postice manifestis.

Clypeus labro vix brevior, margine et ante et in lateribus et postice et costa media elevatis, areas duas impressas, recticulatas cingentibus.

Antennulæ paulo crassiores quam in *C. boreali*, paulum ultra apicem articuli quarti antennarum pedunculi prominentes.

Antennæ marginem posteriorem segmenti quarti trunci attingentes; pedunculus articulo tertio vix longiore quam quarto et paulo breviore quam quinto; flagellum c. 26—articulatum.

Mandibulæ et maxillipedes fere ut in *C. boreali*.

Segmenta trunci longitudine minus inæqualia; segmentum primum capite vix brevius et segmento quinto paulo longius; segmentum septimum longius.

Epimera paulo angustiora quam in *C. neglecta*, ceteroquin ut in illa specie formata et furcata.

Pedes parium trium anteriorum fere ut in *C. boreali* formati, tamen nonnihil graciliores, setis paucioribus et spinis paucioribus et ex parte longioribus instructi.

Pedes quattuor parium posteriorum graciliores quam in *C. boreali* et ab eis sat diversi. Pedes quinti paris elongati, pedibus septimi paris nonnihil longiores et pedibus sexti paris perpaulo breviores; articulus secundus ut in *C. boreali* formatus, setis in series tres dispositis simplicibus; articuli ceteri aliquanto graciliores quam in *C. boreali*, setis et spinis minus numerosis ornati; articulus quartus sat dilatatus, articulus quintus perpaulum dilatatus, uterque in latere superiore spinis paucis ornatus. Pedes quarti paris sat breves. Pedes septimi paris sat aberrantes; articulus secundus complanatus et valde elongatus, circiter duplo et dimidio longior quam latior, margine exteriore setis densis plumosis, margine medio setis paucis simplicibus, margine interiore nudo, margine apicali setis compluribus perlongis, plumosis instructo; articuli ceteri simplices, vix dilatati, breviores, setis perpaucis instructi. Pedes sexti paris a pedibus quinti paris paulum diversi. Segmenta quinque anteriora caudæ et pleopoda structura solita.

Segmentum ultimum caudæ plus dimidio latius quam longius, ad medium prope basin magis in transversum impressum postice marginibus valde in obliquum truncatis, spinis c. 8 et ciliis longis ornatis, apice acuto.

Uropoda sat brevia; ramus interior haud duplo longior quam latior, caudam nonnihil superans, ramo exteriore parvo et angusto multo longior, margine posteriore

CIROLANA OBTRUNCATA Richardson.

Cirolana obtruncata Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 514.—Moore, Report U. S. Commissioner of Fish and Fisheries, XX, Pt. 2, 1902, p. 167, pl. viii, figs. 9–12.

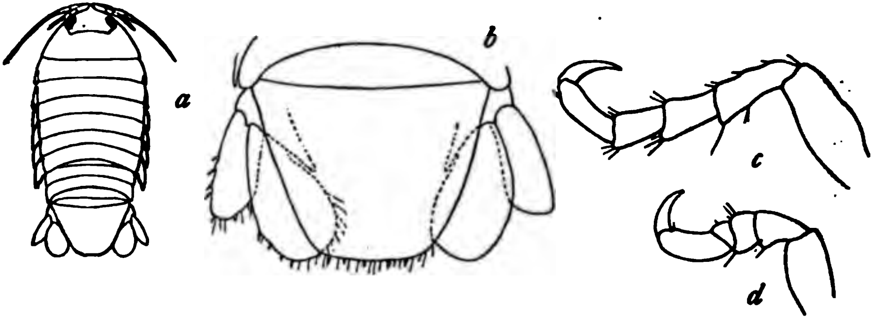

Fig. 87.—Cirolana obtruncata (after Moore). *a*, General figure. *b*, Abdomen (last segment with uropoda). *c*, Seventh leg. *d*, First leg.

Localities.—Kingston, Jamaica; Fajardo, Porto Rico; a third specimen is in the collection of the U. S. National Museum from unknown locality.

Head transversely oval. Eyes small, lateral. First pair of antennæ short, reaching a little beyond the posterior margin of the head; flagellum, twelve jointed.

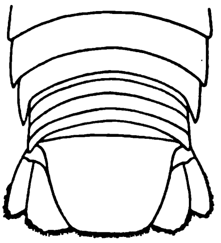

Fig. 88.—Cirolana obtruncata. Abdomen and last two thoracic segments.

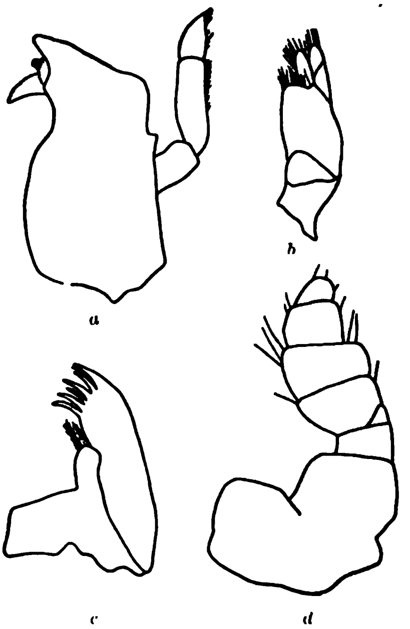

Fig. 89.—Cirolana obtruncata. *a*, Mandible. *b*, Second maxilla. *c*, First maxilla. *d*, Maxilliped. All × 51⅓.

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quam margine anteriore multo breviore, apice vix acuto; ramus uterque spinis parvis paucioribus et ciliis ex parte longis et longioribus quam in speciebus praecedentibus instructus; scapus angulo interiore valde producto, longe ultra medium ramum interiorem prominente.

Color in specimine vetere flavo-brunnescens.

Appendix masculina longa, fere semicirculariter curvata, ultra apicem rami interioris prominens, ubique latitudine et crassitudine fere aequali, apice rotundato.—Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 329–331.

Second pair of antennæ reach the middle of the third thoracic segment; flagellum, twenty-one jointed.

Thoracic segments subequal; first one somewhat longer than others. Epimera of second, third, and fourth segments posteriorly rounded; of fifth, sixth, seventh, and eighth segments pointed posteriorly.

First abdominal segment partly covered by last thoracic segment, following four segments subequal; terminal segment with its posterior margin truncate and minutely crenulate.

Uropoda not longer than posterior margin of terminal segment; inner branch longer and broader than outer branch, and crenulate. Both branches rounded posteriorly.

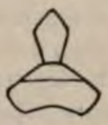


FIG. 90.—CIROLANA OBTRUNCATA. FRONTAL LAMINA, CLYPEUS, AND LABRUM (DIAGRAMMATIC).

Color, brown.

Type specimen from Kingston, Jamaica; taken from surface.

Type.—Cat. No. 23901, U.S.N.M.

CIROLANA HARFORDI (Lockington.)

Æga harfordi Lockington, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 46.
Cirolana californica Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 338–339.—Calman, Ann. N. Y. Acad. Sci., XI, 1898, p. 274.
Cirolana harfordi Richardson, Proc. U. S. Nat. Mus., XXI, 1899, pp. 822–823; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 163; American Naturalist, XXXIV, 1900, p. 217.—Harriman Alaska Expedition, Crustacea, X, 1904, p. 213; Proc. U. S. Nat. Mus., XXVII, 1904, p. 658.—Holmes, Proc. Cal. Acad. Sci. (3), III, 1904, pp. 319–321.

Localities.—Victoria, British Columbia; California; Santa Rosa Island; San Diego; Catalina Harbor; Pacific Grove; Monterey Bay; Lower California; Wilson Cove, California; Santa Cruz, California; Farallones, California; San Pedro, California.

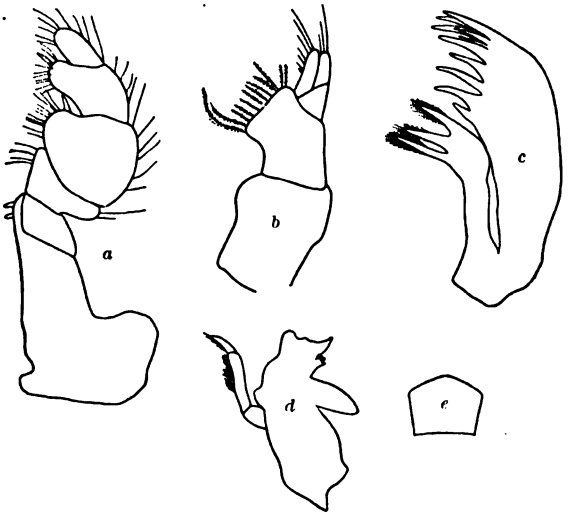
Body oblong-ovate, a little more than twice as long as wide, 3½ mm: 8 mm.

Head wider than long, 1 mm.: 2 mm. with the anterior margin widely rounded. The eyes are small, round, composite, and situated in the antero-lateral angles of the head. The first pair of antennæ have the first two articles about equal in length; the third is twice as long as the second. The flagellum is composed of ten articles. The first antennæ extend to the end of the peduncle of the second antennæ, or to the antero-lateral angle of the first thoracic segment. The second pair of antennæ have the first two articles short, and subequal; the third is a little longer than the second; the fourth is twice as long as the third; the fifth is a little longer than the fourth. The flagellum is composed of thirty-three articles. The second antennæ extend to the posterior margin of the fifth thoracic segment. The maxillipeds are composed of seven articles. The mandible has a palp of three articles.

The frontal lamina is conspicuous, short and broad, with the anterior margin somewhat triangulate.

The first segment of the thorax is twice as long as any of the others, which are subequal. The epimera are distinct on all the segments with the exception of the first. Those of the last two segments have the outer post-lateral angle produced beyond the posterior margins of the segments. A carina crosses all the epimera, being oblique in the last four and longitudinal in the first two.

The first two segments of the abdomen are entirely concealed by the seventh thoracic segment. The sixth or terminal segment is attenuated posteriorly, with the apex rounded, and furnished with eighteen spines placed close together. The inner branch of the uropoda is as long as the terminal segment of the body. It is broad posteriorly, with the posterior margin and the distal end of the exterior margin armed with spines. The outer branch is almost as long as the inner branch, is narrower and rounded posteriorly, and has its margins armed with spines. The peduncle of the uropoda has the inner angle produced to extend two-thirds the length of the last abdominal segment.



IG. 91.—CIROLANA HARFORDI. *a*, MAXILLIPED. × 27½. *b*, SECOND MAXILLA. × 51⅔. *c*, FIRST MAXILLA. × 51⅔. *d*, MANDIBLE. × 27½. *e*, FROTAL LAMINA. × 51⅔.

The first three pairs of legs are prehensile, the last four pairs ambulatory. In the first pair there are three spines on the propodus, one on the carpus, three small sharp ones on the merus, and six large blunt ones, one long slender, pointed one, and one large blunt one on the ischium, with another long stout spine at the outer distal end. On the second and third pairs there is an additional spine on the propodus, three spines on the carpus, nine spines on the merus, with a small spine at the outer distal end, two spines on the ischium, with a long spine at the outer distal extremity.

The specimen described is a very small one. The larger specimens have a greater number of spines on the terminal abdominal segment. The number of spines varies from sixteen to twenty-six, twenty to twenty-two being the average number.

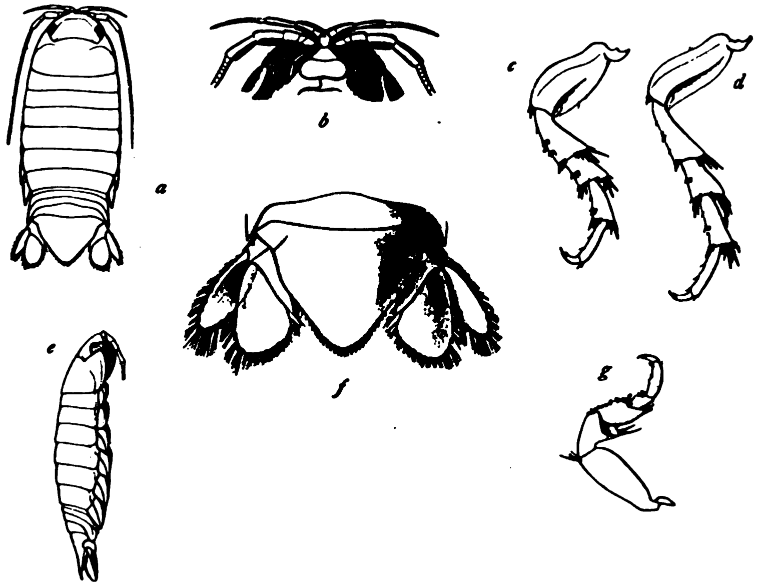


Fig. 92.—Cirolana harfordi (After Hansen). *a*, Dorsal view of female. *b*, Anterior part of head. *c*, Fifth leg. *d*, Seventh leg. *e*, Lateral view of female. *f*, Posterior part of abdomen. *g*, Second leg. (Enlarged.)

CIROLANA PARVA Hansen.

Cirolana parva Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 340–341, pl. ii, figs. 6–6b; pl. iii, figs. 1–1d.—Richardson, American Naturalist, XXXIV, 1900, p. 217; Proc. U. S. Nat. Mus., XXIII, 1901, p. 514.—Moore, Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 167, pl. viii, figs. 6–8.

Localities.—Key West, Florida; Gulf of Mexico; St. Thomas, West Indies; St. Croix, West Indies; between the delta of the Mississippi and Cedar Keys, Florida; Andros Island, Bahamas; between Nassau and Andros, Bahamas; Georgetown, Bahamas.

Depth.—25–27 fathoms.

Among algæ, below low tide; banks, low tide.

Body compact, oblong-ovate, nearly three times longer than wide, 3 mm.: 8 mm.

Head wider than long, 1 mm.: 2 mm., with the anterior margin widely rounded and produced in a small median point, which arches over the antennæ to meet the frontal lamina on the other side. The eyes are small, round, composed of many ocelli, and situated in the

The frontal lamina is conspicuous, short and broad, with the anterior margin somewhat triangulate.

The first segment of the thorax is twice as long as any of the others, which are subequal. The epimera are distinct on all the segments with the exception of the first. Those of the last two segments have the outer post-lateral angle produced beyond the posterior margins of the segments. A carina crosses all the epimera, being oblique in the last four and longitudinal in the first two.

The first two segments of the abdomen are entirely concealed by the seventh thoracic segment. The sixth or terminal segment is attenuated posteriorly, with the apex rounded, and furnished with eighteen spines placed close together. The inner branch of the uropoda is as long as the terminal segment of the body. It is broad posteriorly, with the posterior margin and the distal end of the exterior margin armed with spines. The outer branch is almost as long as the inner branch, is narrower and rounded posteriorly, and has its margins armed with spines. The peduncle of the uropoda has the inner angle produced to extend two thirds the length of the last abdominal segment.

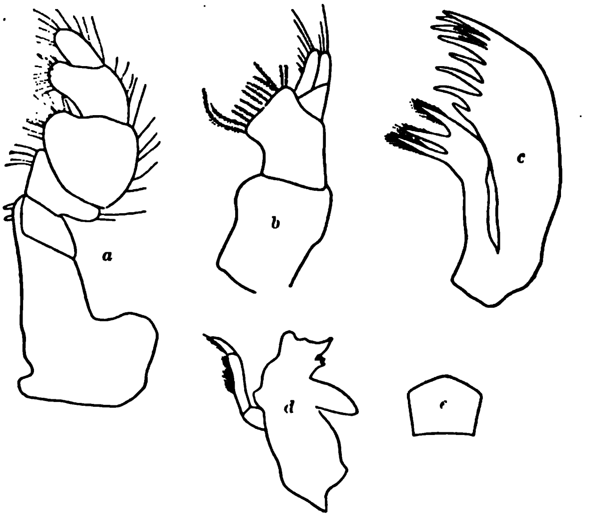


FIG. 91.—CIROLANA HARFORDI. *a*, MAXILLIPED. × 27½. *b*, SECOND MAXILLA. × 51⅓. *c*, FIRST MAXILLA. × 51⅓. *d*, MANDIBLE. × 27½. *e*, FROTAL LAMINA. × 51⅓.

The first three pairs of legs are prehensile, the last four pairs ambulatory. In the first pair there are three spines on the propodus, one on the carpus, three small sharp ones on the merus, and six large blunt ones, one long slender, pointed one, and one large blunt one on the ischium, with another long stout spine at the outer distal end. On the second and third pairs there is an additional spine on the propodus, three spines on the carpus, nine spines on the merus, with a small spine at the outer distal end, two spines on the ischium, with a long spine at the outer distal extremity.

The specimen described is a very small one. The larger specimens have a greater number of spines on the terminal abdominal segment. The number of spines varies from sixteen to twenty-six, twenty to twenty-two being the average number.

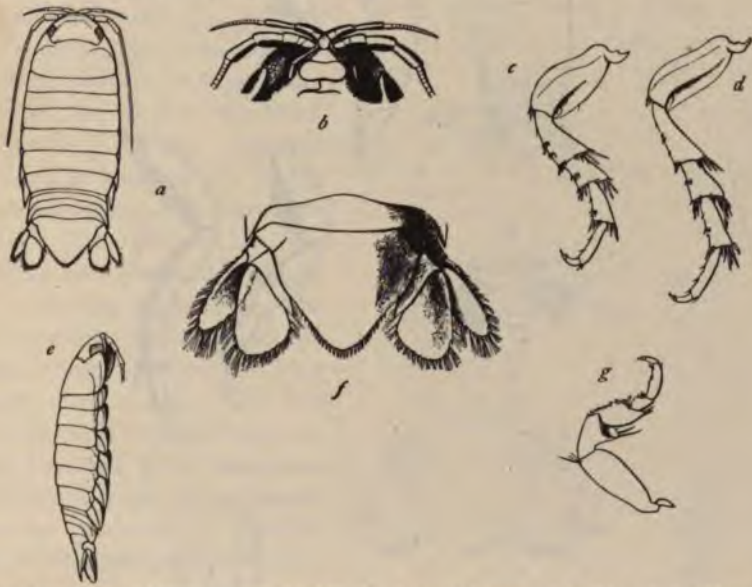


Fig. 92.—Cirolana harfordi (after Hansen). *a*, Dorsal view of female. *b*, Anterior part of head. *c*, Fifth leg. *d*, Seventh leg. *e*, Lateral view of female. *f*, Posterior part of abdomen. *g*, Second leg. (Enlarged.)

CIROLANA PARVA Hansen.

Cirolana parva Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 340–341, pl. ii, figs. 6–6b; pl. iii, figs. 1–1d.—Richardson, American Naturalist, XXXIV, 1900, p. 217; Proc. U. S. Nat. Mus., XXIII, 1901, p. 514.—Moore, Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 167, pl. viii, figs. 6–8.

Localities.—Key West, Florida; Gulf of Mexico; St. Thomas, West Indies; St. Croix, West Indies; between the delta of the Mississippi and Cedar Keys, Florida; Andros Island, Bahamas; between Nassau and Andros, Bahamas; Georgetown, Bahamas.

Depth.—25–27 fathoms.

Among algæ, below low tide; banks, low tide.

Body compact, oblong-ovate, nearly three times longer than wide, 3 mm.: 8 mm.

Head wider than long, 1 mm.:2 mm., with the anterior margin widely rounded and produced in a small median point, which arches over the antennæ to meet the frontal lamina on the other side. The eyes are small, round, composed of many ocelli, and situated in the

The first three pairs of legs are prehensile. The propodus is armed with one spine; the merus with five blunt ones. In the second and third pairs of legs the spines on the merus are sharper, and there is also a long spine at the outer distal extremity; the ischium is, moreover, furnished with one spine. In the third pair there is also a spine on the carpus. The ambulatory legs are beset with spines.

CIROLANA ALBIDA Richardson.

Cirolana albida RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 514–515.

Locality. - Sugarloaf Key, Florida.

This species is rather doubtful and may have to be suppressed, but until further evidence is furnished it may be allowed to stand for the present. It is very close to *Cirolana parva.*

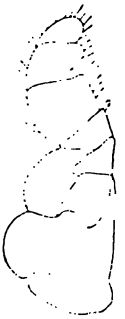


FIG. 96.—CIROLANA ALBIDA. MAXILLIPED. 39.

Body narrow, relaxed, elongate, three and two-thirds times longer than broad. Head transverse; eyes large, black. First pair of antennæ extend to the end of the peduncle of the second pair; flagellum nine jointed. Second pair of antennæ extend to the posterior margin of the third thoracic segment; flagellum twenty-three jointed.

First thoracic segment but little longer than those following, which are subequal in length. First abdominal segment entirely covered by seventh thoracic segment. Terminal segment triangulate with rounded extremity, its posterior margin denticulate and bearing eight spines, the spines alternating with the teeth. The uropoda reach the end of the terminal segment; the inner branch is obliquely truncate posteriorly, and armed with spines; the outer branch is shorter and more slender than the inner branch, is pointed at its extremity, and armed posteriorly and on its external margin with spines.

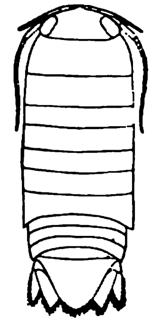


FIG. 97.—CIROLANA ALBIDA.

Color white, with scattered black spots.

Several specimens were taken by Mr. E. L. Morris at Sugarloaf Key, Florida.

Type. Cat. No. 23902, U.S.N.M.

CIROLANA CUBENSIS Hay.

Cirolana cubensis HAY, Proc. U. S. Nat. Mus., XXVI, 1903, pp. 429–435.

Locality. Cuba; in cavern at San Isidro.

Body ovate; a little more than twice as long as wide; 3 mm.: 7 mm. Head twice as wide as long 1 mm.: 2 mm.—with the anterior margin rounded and produced in a median point. The eyes are absent.

The first pair of antennæ have the peduncle composed of only two articles, both long and narrow; the second is a little longer than the first. The flagellum is composed of fourteen articles, and extends to the posterior margin of the second thoracic segment. The second pair of antennæ have the first three articles short and subequal; the fourth and fifth articles are subequal in length, and each is as long as the first three articles taken together. The flagellum is composed of thirty articles, and extends to the middle of the fifth thoracic segment. The maxillipeds are composed of seven articles. The palp of the mandibles is composed of three articles. The frontal lamina is short and broad, with the anterior extremity rounded.

The second, third, and fourth segments of the thorax are subequal, and each is about half as long as the first segment. The fifth, sixth, and seventh segments are subequal, and each is a little longer than any of the three preceding segments. The epimera of all the segments, with the exception of the first, are distinctly separated from the segments. The epimera of the last two segments have the outer post-lateral angle acutely produced. All are crossed by an oblique carina.

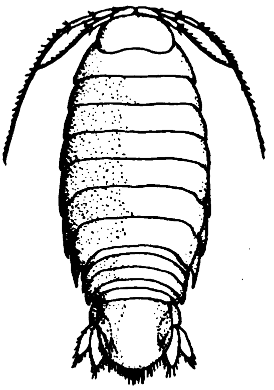


FIG. 98. — CIROLANA CUBENSIS (AFTER HAY).

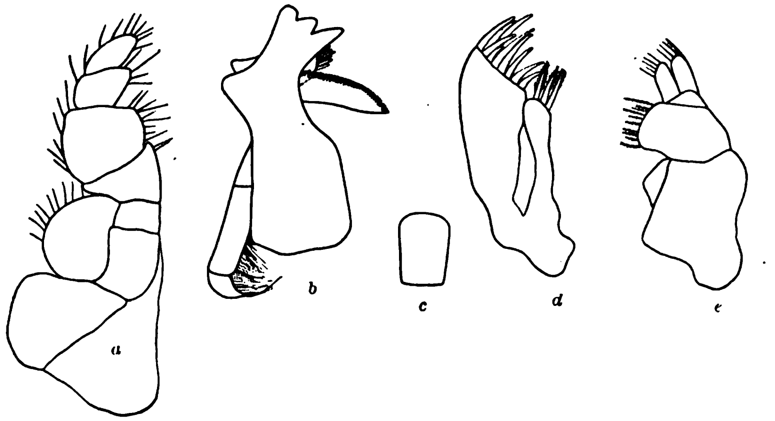


FIG. 99.—CIROLANA CUBENSIS. *a*, MAXILLIPED. × 27½. *b*, MANDIBLE. × 27½. *c*, FRONTAL LAMINA. × 27½. *d*, FIRST MAXILLA. × 27½. *e*, SECOND MAXILLA. × 27½.

The first segment of the abdomen is entirely covered by the seventh thoracic segment, with the exception of the post-lateral angles. The terminal segment is rounded posteriorly and has the posterior margin smooth. The uropoda do not extend beyond the extremity of the abdomen. The inner branch is twice as wide as the outer branch and is posteriorly pointed. The inner branch is obliquely truncate. The margins are smooth and furnished with hairs, as is the terminal abdominal segment. The inner angle of the peduncle of the uropoda is produced. The first pair of legs are somewhat prehensile. All the others are ambulatory.

20. Genus CONILERA Leach.[a]

First pair of antennæ with basal article of peduncle not extended straight in front at right angles to remaining part of antenna. Peduncle of the second pair of antennæ composed of five articles. The plate of the second article of the maxillipeds is furnished with hooks.

The first pair of pleopods have the peduncle elongated, somewhat longer than wide, hard, and furnished on the inner side with about nine hooks; the inner branch is rather elongated, narrow, hard, with the inner margin straight, thick, almost bare, the outer margin furnished with moderately long hairs; the outer branch is shorter than the inner branch, ovate, hard, furnished with a longitudinal furrow, with the posterior margin furnished with moderately long hairs; the pleopods thus form a large operculum, covering the other pleopods. The peduncle of the second pair of pleopods is scarcely wider than long; the branches are of the usual structure.

The peduncle of the uropoda has the inner posterior angle somewhat produced.

The six segments of the abdomen are distinct.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CONILERA.

a. Eyes present. First pair of antennæ extend to the middle of the fifth article of the peduncle of the second pair of antennæ. The second pair of antennæ extend to the middle of the first thoracic segment. Body four times longer than wide. *Conilera cylindracea* (Montagu)

a′. Eyes wanting. First pair of antennæ extend to the middle of the first thoracic segment. The second pair of antennæ extend to the middle of the seventh thoracic segment. Body five times longer than wide... *Conilera stygia* Packard

CONILERA CYLINDRACEA (Montagu).

Oniscus cylindraceus Montagu, Trans. Linn. Soc. Lond., VII, 1804, p. 71, pl. vi, fig. 8.

Conilera montagui Leach, Dict. Sci. Natur., XII, 1818, p. 348.—Desmarest, Consid. Crust., 1825, p. 304.—Milne Edwards, Hist. Nat. Crust., III, 1840, p. 242.

Conilera cylindracea Bate and Westwood, Brit. Sessile-eyed Crustacea, II, 1868, p. 304.—Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 358–361, pl. iv, figs. 5–5e; pl. v, figs. 1–1d.—Richardson, American Naturalist, XXXIV, 1900, p. 217; Proc. U. S. Nat. Mus., XXIII, 1901, p. 515.—Norman, Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 438.

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[a] See Hansen for characters of genus, Vidensk Selsk. Skr. (6), V, 1890, pp. 358.

Localities.—Off South Carolina; between the Delta of the Mississippi and Cedar Keys, Florida; also Gulf of Naples; coast of England; coast of France.

Depth.—111–159 fathoms.

Off Pilchards.

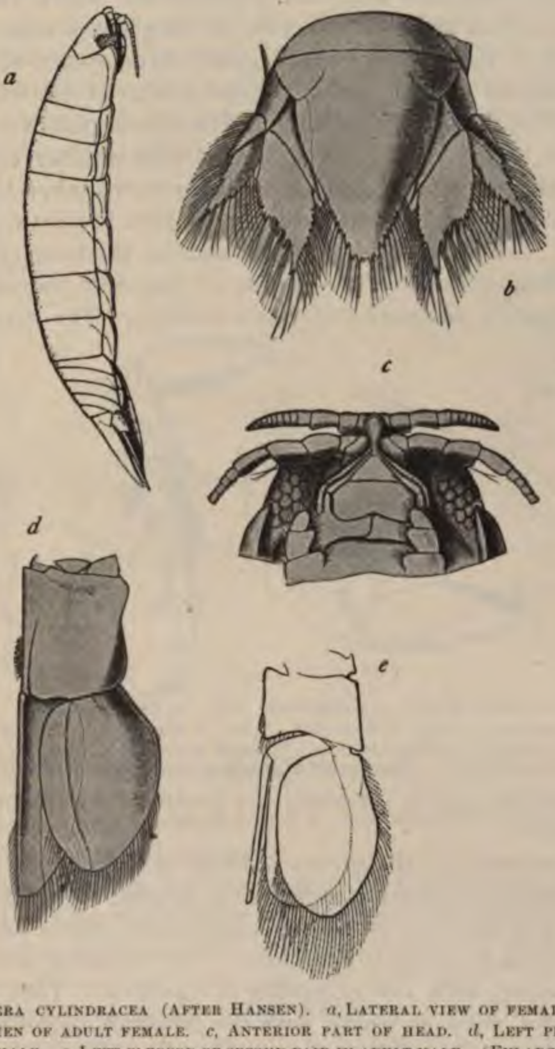

Fig. 100.—Conilera cylindracea (After Hansen). *a*, Lateral view of female. *b*, Posterior part of abdomen of adult female. *c*, Anterior part of head. *d*, Left pleopod of first pair in adult male. *e*, Left pleopod of second pair in adult male. (Enlarged.)

The dog-fish is infested with these parasites, which reduce their prey to skin and bones. They hunt, according to Dr. F. Day,[a] in shoals, driving away the congers and other fish, but are themselves devoured by the bream.

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[a] Proc. Zool. Soc. Lond., 1884, p. 44.

Body narrow, elongate, a little more than four times longer than broad, 4 mm.: 17 mm., almost cylindrical.

Head wider than long, 2 mm.: 3 mm., with the frontal margin slightly excavate on either side of a small median point. Eyes small, round, composite, and situated in the antero-lateral angles of the head. The first pair of antennæ have the basal article short, but somewhat dilated; the second article is not quite as long as the first; the third is twice as long as the second. The flagellum is composed of ten articles. The first antennæ extend almost to the middle of the fifth article of the peduncle of the second antennæ. The second pair of antennæ have the first two articles short, the second a little shorter than the first; the third article is equal in length to the first two taken together; the fourth is a little longer than the third; the fifth is a little longer than the fourth. The flagellum is composed of thirteen articles. The second antennæ extend to the middle of the first thoracic segment. The maxilliped is composed of seven articles. The mandible has a palp of three articles. The frontal lamina is conspicuous on the ventral side; the anterior end is rounded; the posterior end is produced in a narrow process.

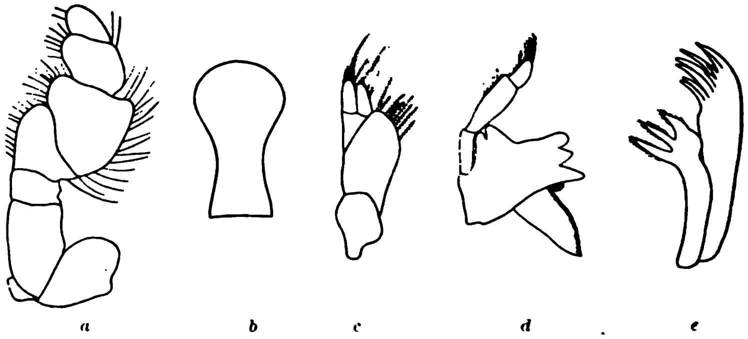

FIG. 101.—CONILERA CYLINDRACEA. a, MAXILLIPED. × 27½. b, FRONTAL LAMINA. × 51⅓. c, SECOND MAXILLA. × 27½. d, MANDIBLE. × 27½. e, FIRST MAXILLA. × 27½.

The first segment of the thorax is twice as long as the second; the second and third are equal in length; the fourth, fifth, and sixth segments are equal and each is one and a half times longer than the third; the last segment is equal to the third. The epimera are distinct on all the segments, with the exception of the first. They are narrow, elongate plates, equal in width, with the posterior angles not produced beyond the posterior margins of the segments. In the epimera of the first four segments the posterior extremity is rounded; in the last two the outer post-lateral angle is not rounded, but angular. A carina crosses all the segments obliquely:

The first segment of the abdomen is entirely concealed by the seventh thoracic segment except at the sides. The terminal segment is triangular, with the apex very acute. The posterior margin at the apex and on either side of the apex for some distance is denticulate. The inner branch of the uropoda is a very little longer than the terminal abdominal segment. It is posteriorly very acutely produced with an emargination in the exterior margin near the apex. Both inner and outer margins are denticulate, the four teeth within the emargination being very much larger than the others. There is also a large tooth on the inner margin close to the apex of the branch, giving the extremity a bidentate appearance. The outer branch is half as wide as the inner branch, is somewhat shorter, not extending beyond the emargination in the outer margin of the inner branch, has the extremity acutely produced and bidentate, and has both margins denticulate. The peduncle has the inner angle produced and it extends two-thirds the length of the terminal abdominal segment.

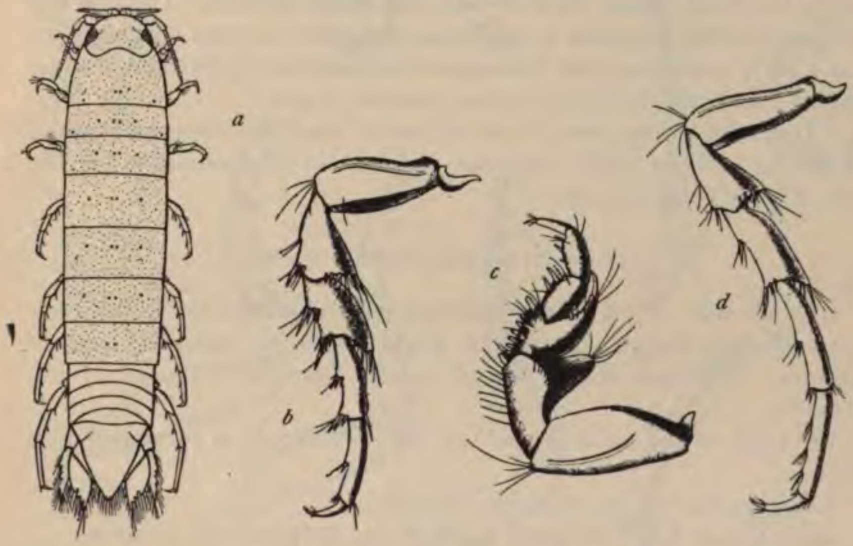

FIG. 102.—CONILERA CYLINDRACEA (AFTER HANSEN). *a*, ADULT FEMALE. *b*, SECOND LEG. *c*, FIFTH LEG. *d*, SEVENTH LEG. (ENLARGED.)

The first three pairs of legs are prehensile, the last four pairs ambulatory. In the first three pairs the propodus is armed with three spines, the carpus with one large spine and one small spine in the first pair or two smaller ones in the second and third pairs; the merus with five or six blunt ones on the inner margin and one long one at the outer distal extremity; the ischium is armed with one spine in the second and third pairs.

The two specimens from North America in the collection of the U. S. National Museum are small, measuring 2½ mm. : 10½ mm.

The description is from a specimen obtained from the Naples Zoological Station.

CONILERA STYGIA Packard.

Conilera stygia Packard, Proc. Amer. Assoc. Adv. Sci., XLIX, 1901, p. 228.

Locality.—Monterey, Mexico. Found in wells.

"It is totally eyeless, and adds another to the blind fauna of our caves and wells. Hitherto the genus has been represented by but a single species, inhabiting the British coast. Compared with Bate and Westwood's figure of *C. cylindracea*, the body is longer, the antennæ much longer, reaching to the middle of the first thoracic segment, those of the second pair nearly to the middle of the seventh thoracic segment. Only the first three pairs of legs are short, with a very thick hand; the four hinder pairs of legs are long, slender. The two last divisions of the pleopoda are unequal, the outer division very narrow, but a little more than half as long as the broad inner division or endopodite. Length of body, 25 mm.; breadth, 5 mm.

"This form is like most, if not all, other blind or eyeless arthropods in having a longer body, antennæ, and legs in compensation for the loss of eyes."[a]—Packard.

21. Genus CIROLANIDES Benedict.

Eyes absent. First pair of antennæ with basal article of peduncle not extended straight in front at right angles to remaining part of antenna. Peduncle of the second pair of antennæ composed of five articles.

The plate of the second article of the maxillipeds is furnished with hooks.

Abdomen has all six segments distinct.

The uropoda have the inner angle of the peduncle not produced.

Only the first pair of legs are prehensile; the following six pairs are ambulatory.

CIROLANIDES TEXENSIS Benedict.

Cirolanides texensis Benedict, Proc. U. S. Nat. Mus., XVIII, 1896, p. 615.—Richardson, American Naturalist, XXXIV, 1900, p. 217.—Ulrich, Trans. Am. Microscopical Soc., XXIII, 1902, pp. 88–90, pl. xv.

Locality.—San Marcos, Texas, found in an artesian well.

Body oblong-ovate, about two and a half times longer than wide, 7 mm. : 17 mm.

Head wider than long, 2 mm. : 3 mm. Anterior margin widely rounded. Eyes absent. The first pair of antennæ have the basal article short; the second twice as long as the first; the third one and a half times longer than the second. The flagellum is composed of fifteen articles. The first antennæ extend to the posterior margin

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[a] Proc. Amer. Assoc. Adv. Sci., XLIX, 1901, p. 228.

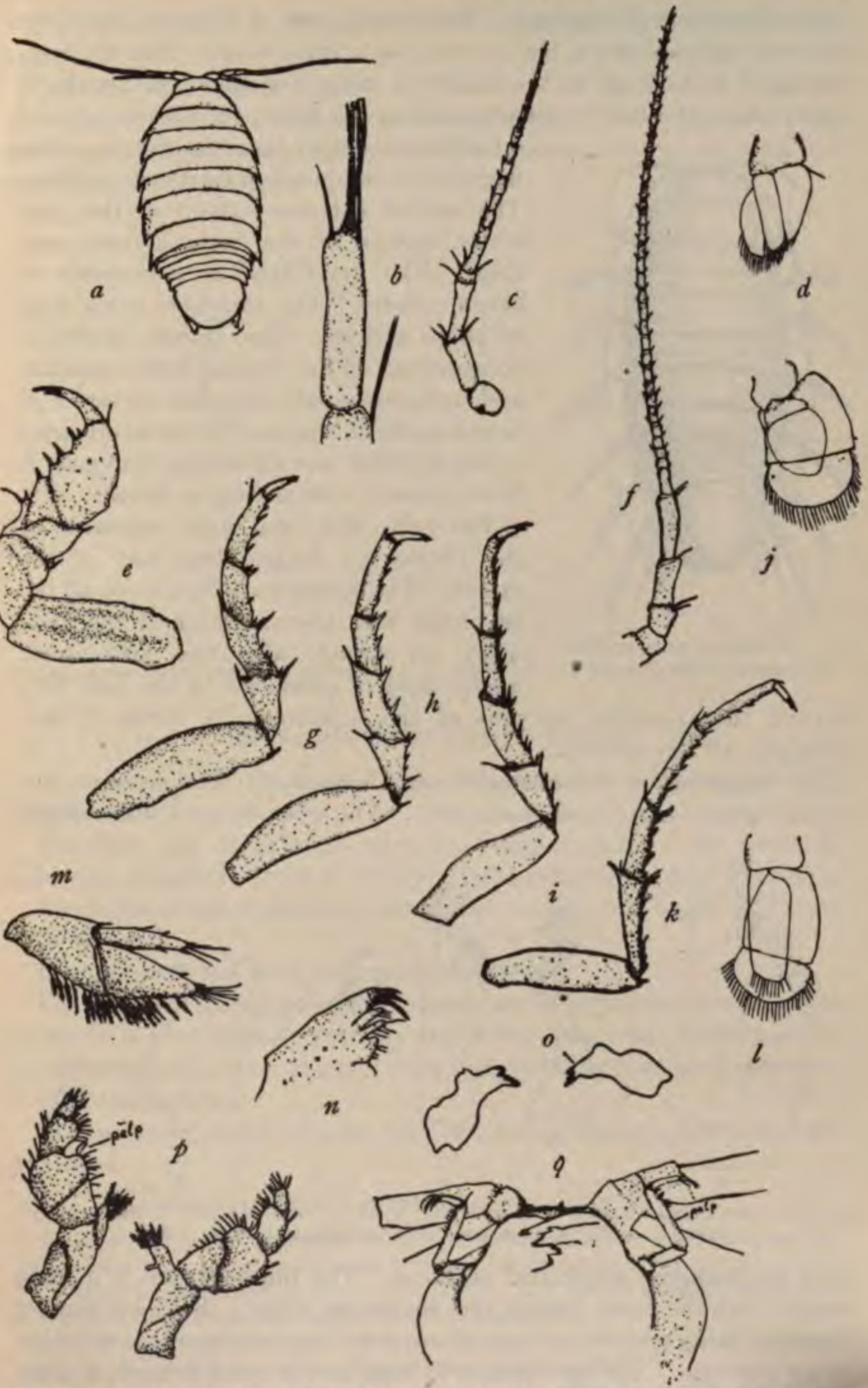

FIG. 103.—CIROLANIDES TEXENSIS (AFTER ULRICH). *a*, DORSAL VIEW. *b*, END OF SECOND ANTENNA, *c*, FIRST ANTENNA. *d*, FIRST PLEOPOD. *e*, FIRST LEG. *f*, SECOND ANTENNA. *g*, SECOND LEG. *h*, THIRD LEG. *i*, FOURTH LEG. *j*, THIRD PLEOPOD. *k*, FIFTH LEG. *l*, SECOND PLEOPOD. *m*, UROPOD. *n*, MAXILLA. *o*, MANDIBLES, *p*, MAXILLIPEDS. *q*, VENTRAL SIDE OF HEAD.

of the first thoracic segment. The second pair of antennæ have the first two articles short, the second one a little longer than the first; the third is as long as the first two taken together; the fourth is nearly one and a half times longer than the third; the fifth is one and a half times longer than the fourth. The flagellum is composed of thirty-six articles. The second antennæ extend to the posterior margin of the fifth thoracic segment. The maxilliped is composed of seven articles. The mandible has a palp of three articles. The frontal lamina is conspicuous on the ventral side, is narrow and compressed laterally, and elevated; it is triangular in shape, with the acute apex of the anterior end extending forward; it is also about twice as long as broad.

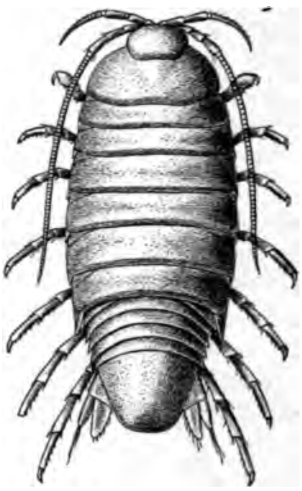

FIG. 104.[a]—CIROLANIDES TEXENSIS. × 4½.

The first, fifth, and sixth segments of the thorax are longer than any of the others. The epimera are distinct on all the segments with the exception of the first. They are broad, with the post-lateral angles acutely produced in the last four beyond the posterior margins of the segments. A carina crosses obliquely all the epimera.

The segments of the abdomen are all distinct. The sixth or terminal segment is rounded posteriorly. The uropoda are a little longer than the terminal abdominal segment. The inner branch is a little longer than the outer branch and somewhat wider. Both are similar in shape, being wider anteriorly than posteriorly, the narrow extremity being truncate. The peduncle is as long as the outer branch, a little more than half the length of the terminal abdominal segment, and is

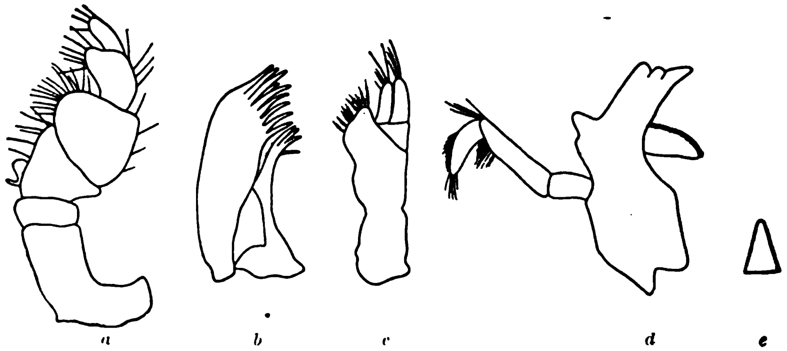

FIG. 105.—CIROLANIDES TEXENSIS. a, MAXILLIPED. × 27½. b, FIRST MAXILLA. × 27½. c, SECOND MAXILLA. × 27½. d, MANDIBLE. × 27½. e, FRONTAL LAMINA. × 51½.

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[a] Figs. 104 and 106 are by the courtesy of Dr J. E. Benedict.

not produced at its inner angle. Both branches are furnished with spines.

Only the first pair of legs are prehensile. All the others, from the second to the seventh inclusive, are ambulatory. The propodus of the first pair of legs is furnished with three spines; the carpus with one and the merus with one.

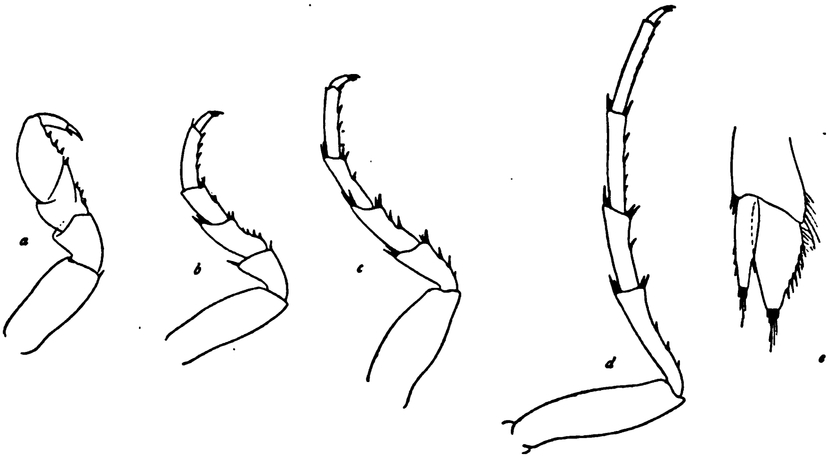

FIG. 106.—CIROLANIDES TEXENSIS. *a*, FIRST LEG. *b*, SECOND LEG. *c*, FOURTH LEG. *d*, SEVENTH LEG. *e*, UROPOD.

22. Genus EURYDICE Leach.

The peduncle of the second pair of antennæ is composed of four articles.

The first pair of antennæ have the basal article of the peduncle extended straight in front at right angles to remaining part of antenna.

The plate of the second article of the maxillipeds is not furnished with hooks.

The abdomen has all six segments distinct.

The first and second pairs of pleopods are subequal in structure; the peduncle is very little or scarcely any wider than long; both branches are submembranaceous, the posterior margin being furnished with very long plumose hairs.

The peduncle of the uropoda has the inner posterior angle very little produced.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS EURYDICE.

a. Terminal abdominal segment rounded posteriorly between the post-lateral triangular teeth. Posterior margin between the lateral teeth denticulate, a spine alternating with each tooth .... *Eurydice convexa* Richardson

a'. Terminal abdominal segment not rounded posteriorly.

  b. Terminal abdominal segment truncate between the triangular lateral teeth and furnished with four long spines on the posterior margin. *Eurydice caudata* Richardson

  b'. Terminal abdominal segment widely emarginate in the middle between truncate post-lateral angles, each angle being furnished with two rol spines .... *Eurydice spinigera* Han

EURYDICE CONVEXA Richardson.

Eurydice convexa RICHARDSON, American Naturalist, XXXIV, 1900, p. 217; Proc. U. S. Nat. Mus., XXIII, 1901, p. 516.

Locality.—Cape San Blas, Florida.

Head transverse; anterior margin rounded. Eyes quadrangular. First pair of antennæ short, reaching the middle of the last peduncular joint of the second pair of antennæ, or the posterior margin of the head; flagellum four-jointed. Second pair of antennæ long, reaching the anterior margin of the terminal abdominal segment in the female; flagellum eighteen-jointed. In the male the second pair of antennæ are equal to the entire length of body, reaching the tip of the terminal segment.

Thoracic segments subequal in length.

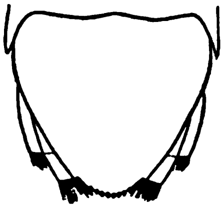

FIG. 107.—EURYDICE CONVEXA. TERMINAL ABDOMINAL SEGMENT.

Abdomen in female shorter than thorax and head together; abdomen in male about equal to thorax and head.

First five segments equal in length. Terminal segment rounded posteriorly, with post-lateral triangular teeth, between which, a space intervening, the posterior margin is denticulate, a spine alternating with each tooth. The uropoda are short, not reaching the extremity of the terminal segment. Both branches are truncate and crenulate on their exterior margins and fringed with long hairs.

Color, light brown, with odd-shaped markings of black.

A number of specimens were taken by the U. S. Bureau of Fisheries steamer *Albatross* at Cape San Blas, Florida.

Type.—Cat. No. 10049, U.S.N.M.

EURYDICE CAUDATA Richardson.

Eurydice caudata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 824–825; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 164–165.

Locality.—Isthmus Cove, Catalina Island, California.

Body elongate and narrow. In male, abdomen is equal in length to thorax; in female, it is shorter. Surface of body smooth.

Head widely rounded in front; its anterior margin narrowly thickened. Eyes large and round and situated at a distance of one-third the width of the head apart. First pair of antennæ extend to the posterior margin of the head; flagellum consists of five articles, the first of which is very long and those following quite short. The second pair of antennæ extend as far as the posterior margin of the fourth segment of the abdomen; the flagellum consists of twenty-five long, slender joints. In the female, the second pair of antennæ are much shorter, reaching only to the posterior margin of the last thoracic segment; the flagellum consists of about twenty joints.

The thoracic segments are subequal. The epimera are narrow, and those of the last three or four segments acutely pointed.

All the abdominal segments are visible in a dorsal view. The terminal segment is rounded at the sides and truncate at its extremity, the lateral angles being produced in a short triangular process, between which the posterior margin is distinctly denticulate and bears four spines, which are about twice as long as the lateral teeth. The uropoda are short, not reaching the extremity of the terminal segment, are truncate and crenulate on their posterior margins. The uropoda, as well as the terminal segment, are fringed with short hairs.

The legs are long and slender and armed with many spines.

Color, light brown marked with black spots.

Individuals of this species were collected at Isthmus Cove, Catalina Island, California, by the U. S. Bureau of Fisheries steamer *Albatross*.

Type.—No. 22565, U.S.N.M.

This species resembles *E. grimaldii* Dollfus more closely than any other species of the genus. It differs in the following characters:

1. The greater number of joints in the flagellum of the first pair of antennæ. In our species there are five joints, while in *E. grimaldii* the flagellum is uniarticulate.

2. In the fewer number of joints in the flagellum of the second pair of antennæ. In our species there are only twenty-five, while in *E. grimaldii* the flagellum consists of thirty-two articles.

3. In the presence of four spines on the posterior margin of the terminal segment. In *E. grimaldii* the posterior margin is denticulate.

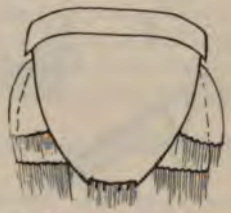

FIG. 108.—EURYDICE CAUDATA. LAST TWO ABDOMINAL SEGMENTS. (GREATLY ENLARGED.)

EURYDICE SPINIGERA Hansen.

Eurydice spinigera HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 367-369, pl. V, figs. 4-4c; pl. VI, figs. 1-1c.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 516.

Locality.—West Indies.[a]

This species is similar to *E. elegantula*. The body is broader than in the male of *E. elegantula* and is a little more than three times longer than wide; the thorax is much wider and not shorter than the abdomen.

The front of the head is a little emarginate, the median process being absent. The eyes are as in the male of *E. elegantula*. The first pair of antennæ are a little stouter than in the female of *E. elegantula;* the first article of the peduncle is narrower, manifestly reaching beyond the second article; the third article is a little wider than long; the flagellum is furnished with rather numerous, rather the fourth pair with numerous stout spines along its internal edge, these becoming fewer and weaker on posterior pairs, which are more abundantly furnished with long slender setæ, the fifth joint of last pair of legs broad and almost rectangular.

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[a] Hansen, in a paper received since this paper was sent to press, says that this species was captured in the eastern part of the Atlantic between Denmark and St. Thomas.

"Abdominal appendages subsimilar, the uropods not projecting beyond the margin of telson, attached to underside, in structure similar to the pleopods and probably branchial in function.

"Color gray, with arborescent brown pigmentation becoming more dense posteriorly, on abdomen collected principally in a median wedge-shaped mass with the apex on base of telson, each segment of pleon with two subelliptical paler lateral areas, with about twenty-five to thirty longitudinal lines of pigmentation, the areas between which are reticulated with brown. Mandibles, legs, and underside of body more or less pigmented.

"One specimen, from station 6079, 20 fathoms, 6 by 2.2 mm."—Moore.[a]

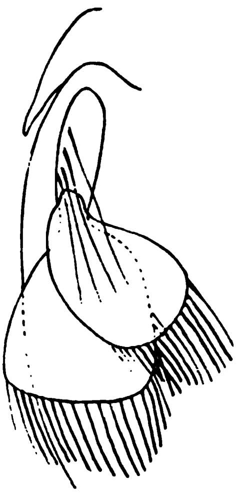

Fig. 111.—Branchuropus littoralis (after Moore). Uropoda from below.

24. Genus BATHYNOMUS A. Milne Edwards.

Second pair of antennæ with a peduncle composed of five articles;[b] rudimentary scale attached to end of peduncle of first antennæ.

The plate of the second article of the maxillipeds furnished with hooks.

Abdomen with all six segments distinct.

Pleopoda with supplementary ramified branchiæ developed at the base of the inner branches.

BATHYNOMUS GIGANTEUS A. Milne Edwards.

Bathynomus giganteus A. Milne Edwards, Compt. Rend. Acad. Sci., LXXXVIII, 1879, pp. 21-23; Ann. Mag. Nat. Hist. (5), III, 1879, pp. 241–243.—Filhol, La vie au fond des Mers, 1885, p. 147.—Marshall, Die Tiefsee und ihr Leben, 1888, p. 261, fig. 86.—Agassiz, Bull. Mus. Comp. Zool., Harvard College, XV, 1888, p. 49, fig. 252. Hansen, Vidensk. Selsk. Skr. Math. og Naturvid., Afd. (6), V, No. 3, 1890, pp. 252, 318, 378.—Wood-Mason and Alcock, Ann. Mag. Nat. Hist. (6), VII, 1891, p. 270.—Ortmann, Proc. Acad. Nat. Sci. Phila., 1894, p. 191.—Bouvier, Bull. Soc. Entom, France, 1901, pp. 122-123; Compt. Rend. Acad. Sci., CXXXII, 1901, pp. 643–645.—A. Milne Edwards and Bouvier, Mem. Mus. Comp. Zool., Harvard College, XXVII, No. 2, 1902, pp. 141-159, pls. i-vi.—Hansen, Journ. Linn. Soc. London, Zool., XXIX, 1903, pp. 12-25, pl. iv, figs. 8–9.

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[a] Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 168.

[b] See remarks at end of description.

Localities.—West Indies; Gulf of Mexico; Caribbean Sea; Mouth of Exuma Sound; Bay of Bengal.

Depth.—955 fathoms; 740 fathoms.

Body oblong-ovate, nearly two and a half times longer than wide, 38 mm. : 90 mm.

Head wider than long, 12 mm. : 21 mm., with the anterior margin produced in a median point which meets the apex of the triangular frontal lamina. The eyes are large, composite, and are situated on the inferior side of the head. The first pair of antennæ have the basal article large, about as wide as long; the second is about as long as the first; the third is half as long as the second; there is a small scale articulated to the end of the third article of the peduncle; the flagellum is composed of forty-six articles and extends one-fourth the length of the first thoracic segment. The second pair of antennæ have the first article short; the second is almost at right angles to the first and is about 2 mm. long; the third is about as long as the second; the fourth is about 3 mm. in length; the fifth is 4 mm. long. The flagellum is composed of about sixty-six articles and extends to the middle of the fourth thoracic segment. The maxillipeds are composed of seven articles. The frontal lamina is triangular in shape, with the apex contiguous with the median point of the frontal margin of the head.

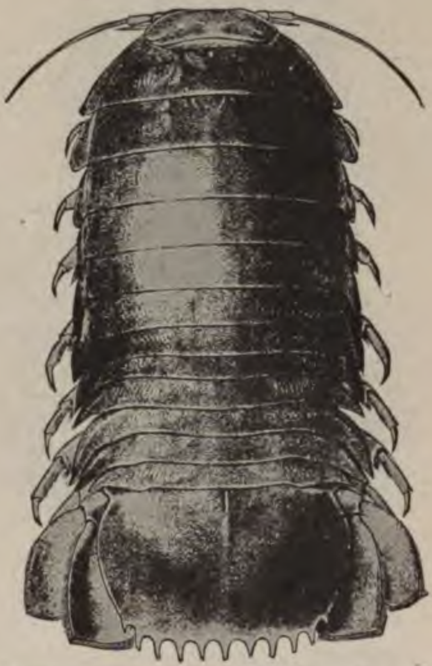

FIG. 112.—BATHYNOMUS GIGANTEUS (AFTER EDWARDS AND AGASSIZ). DORSAL VIEW.

The first segment of the thorax is the longest, being 10 mm. in length. The second and third are subequal, and each is 6 mm. long. The fourth and fifth are each 5 mm. in length. The sixth and seventh are each 4 mm. long. The epimera are distinctly separated on all the segments with the exception of the first, and are large plates with the outer post-lateral angle produced in the last four beyond the posterior margin of the segments.

The six segments of the abdomen are distinct, the first five being subequal in length. The sixth or terminal segment is wider than the fourth pair with numerous stout spines along its internal edge, these becoming fewer and weaker on posterior pairs, which are more abundantly furnished with long slender setæ, the fifth joint of last pair of legs broad and almost rectangular.

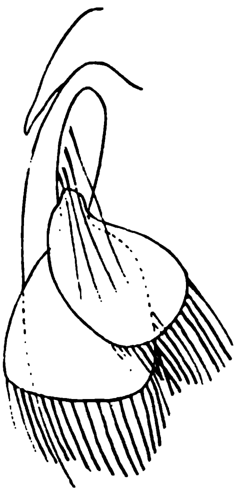

FIG. 111.—BRANCHUROPUS LITTORALIS (AFTER MOORE). UROPODA FROM BELOW.

"Abdominal appendages subsimilar, the uropods not projecting beyond the margin of telson, attached to underside, in structure similar to the pleopods and probably branchial in function.

"Color gray, with arborescent brown pigmentation becoming more dense posteriorly, on abdomen collected principally in a median wedge-shaped mass with the apex on base of telson, each segment of pleon with two subelliptical paler lateral areas, with about twenty-five to thirty longitudinal lines of pigmentation, the areas between which are reticulated with brown. Mandibles, legs, and underside of body more or less pigmented.

"One specimen, from station 6079, 20 fathoms, 6 by 2.2 mm."—MOORE.[a]

24. Genus BATHYNOMUS A. Milne Edwards.

Second pair of antennæ with a peduncle composed of five articles;[b] rudimentary scale attached to end of peduncle of first antennæ.

The plate of the second article of the maxillipeds furnished with hooks.

Abdomen with all six segments distinct.

Pleopoda with supplementary ramified branchiæ developed at the base of the inner branches.

BATHYNOMUS GIGANTEUS A. Milne Edwards.

Bathynomus giganteus A. MILNE EDWARDS, Compt. Rend. Acad. Sci., LXXXVIII, 1879, pp. 21–23; Ann. Mag. Nat. Hist. (5), III, 1879, pp. 241–243.—FILHOL, La vie au fond des Mers, 1885, p. 147.—MARSHALL, Die Tiefsee und ihr Leben, 1888, p. 261, fig. 86.– AGASSIZ, Bull. Mus. Comp. Zool., Harvard College, XV, 1888, p. 49, fig. 252.—HANSEN, Vidensk. Selsk. Skr. Math. og Naturvid., Afd. (6), V, No. 3, 1890, pp. 252, 318, 378.—WOOD-MASON and ALCOCK, Ann. Mag. Nat. Hist. (6), VII, 1891, p. 270.—ORTMANN, Proc. Acad. Nat. Sci. Phila., 1894, p. 191.—BOUVIER, Bull. Soc. Entom, France, 1901, pp. 122–123; Compt. Rend. Acad. Sci., CXXXII, 1901, pp. 643–645.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zool., Harvard College, XXVII, No. 2, 1902, pp. 141–159, pls. I–VI.—HANSEN, Journ. Linn. Soc. London, Zool., XXIX, 1903, pp. 12–25, pl. IV, figs. 8–9.

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[a] Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 168.

[b] See remarks at end of description.

Localities.—West Indies; Gulf of Mexico; Caribbean Sea; Mouth of Exuma Sound; Bay of Bengal.

Depth.—955 fathoms; 740 fathoms.

Body oblong-ovate, nearly two and a half times longer than wide, 38 mm. : 90 mm.

Head wider than long, 12 mm. : 21 mm., with the anterior margin produced in a median point which meets the apex of the triangular frontal lamina. The eyes are large, composite, and are situated on the inferior side of the head. The first pair of antennæ have the basal article large, about as wide as long; the second is about as long as the first; the third is half as long as the second; there is a small scale articulated to the end of the third article of the peduncle; the flagellum is composed of forty-six articles and extends one-fourth the length of the first thoracic segment. The second pair of antennæ have the first article short; the second is almost at right angles to the first and is about 2 mm. long; the third is about as long as the second; the fourth is about 3 mm. in length; the fifth is 4 mm. long. The flagellum is composed of about sixty-six articles and extends to the middle of the fourth thoracic segment. The maxillipeds are composed of seven articles. The frontal lamina is triangular in shape, with the apex contiguous with the median point of the frontal margin of the head.

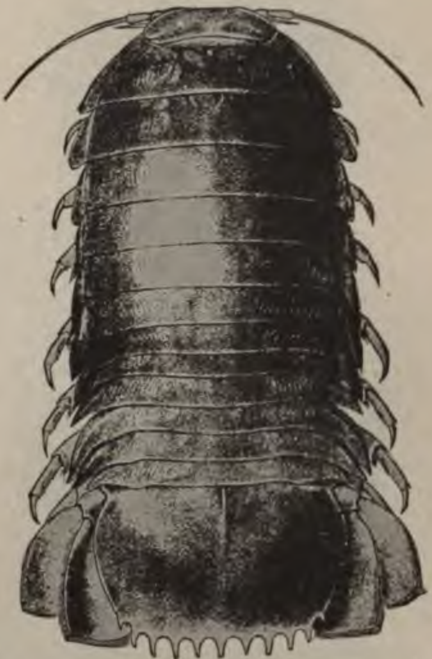

FIG. 112.—BATHYNOMUS GIGANTEUS (AFTER EDWARDS AND AGASSIZ). DORSAL VIEW.

The first segment of the thorax is the longest, being 10 mm. in length. The second and third are subequal, and each is 6 mm. long. The fourth and fifth are each 5 mm. in length. The sixth and seventh are each 4 mm. long. The epimera are distinctly separated on all the segments with the exception of the first, and are large plates with the outer post-lateral angle produced in the last four beyond the posterior margin of the segments.

The six segments of the abdom et, the first five being subequal in length. The sixt gment is wider than long, and has the posterior margin widely rounded and armed with eleven long teeth, five on either side of the median one. This segment is 27 mm. long. The uropods do not quite reach the extremity of the terminal abdominal segment. The inner branch is nearly twice as wide as the outer branch and is a little longer. Both are truncate posteriorly and have the exterior and posterior margins armed with numerous spines. The peduncle of the uropoda has the inner angle but little produced. The pleopoda have ramified branchiæ developed at the base of the inner branch.

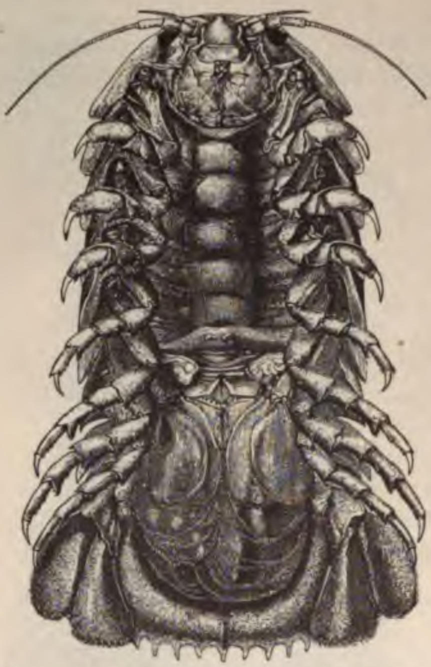

FIG. 113.—BATHYNOMUS GIGANTEUS (AFTER FILHOL). VENTRAL VIEW.

The first three pairs of legs are prehensile, the last four pairs ambulatory. They are all armed with numerous spines.

A larger specimen in the collection of the U. S. National Museum measures 4 in.: 8½ in. It is from the Gulf of Mexico.

Wood-Mason and Alcock[a] describe the living animal as being a pale lilac color. Bouvier says that while the isopods usually have at the most in each eye thirty to forty ocelli, which measure eight to ten centimeters, with a diameter of a millimeter, *B. giganteus* has almost three thou-

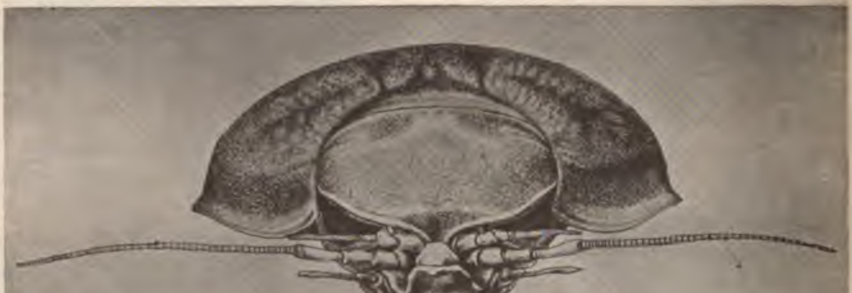

FIG. 114.—BATHYNOMUS GIGANTEUS (AFTER EDWARDS AND BOUVIER). HEAD WITH APPENDAGES AND FIRST THORACIC SEGMENT.

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[a] Ann. Mag. Nat. Hist. (6), VII, 1891, p. 270.

sand, the surface of which is almost doubled. This increase in the measure of the eye is not an effect of the increase in size of the figure, for *B. döderleini* Ortmann has the ocelli almost as large and as numerous as *B. giganteus;* it is entirely the result of adaptation to abyssal life. In order to collect in the greatest number the feeble phosphorent rays which lighten the depth of the seas, the eyes of *Bathynomus* are greatly enlarged and resemble the eyes of abyssal Galatheides (Munida), in which the deficiency of the light at the great depths has not yet produced blindness.

In the two species of *Bathynomus* he has been able to prove that the sympodite of the pleopods has always three articles, that it is the same for the peduncle of the antennulæ, and that a rudiment of an accessory appendage exists at the apex of this peduncle. The presence of this accessory appendage is a primitive character which brings the *Bathynomus*, and consequently the Cirolanidæ, closer to the group of Anisopods.

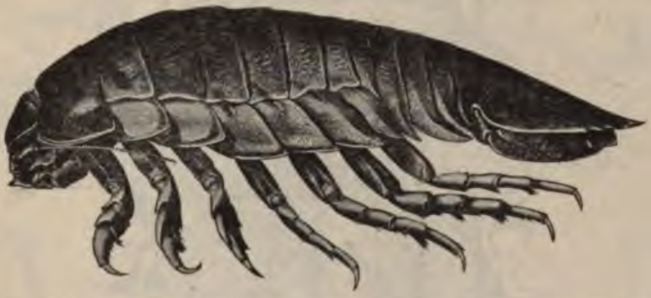

FIG. 115.—BATHYNOMUS GIGANTEUS (AFTER EDWARDS AND BOUVIER). LATERAL VIEW.

Hansen points out that the peduncle of the second pair of antennæ is really composed of six articles in this form and others, but the first article is so small it has heretofore been overlooked.[a] Apparently the peduncle of the second antennæ is composed of five articles.

25. Genus COLOPISTHUS Richardson.

Head transversely elongated. Eyes situated in the middle of the lateral margins at the extreme edge and elevated knob-like above the surface.

Both pairs of antennæ short; first pair of antennæ with basal article of peduncle not extended straight in front at right angles to remaining part of antenna; second pair reach the posterior margin of the first thoracic segment.

First five abdominal segments consolidated into one short segment. Terminal segment strongly keeled in the median longitudinal line.

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[a] Edwards and Bouvier describe the peduncle as six-jointed, but, according to Hansen, they were in error in regard to the position of the first joint.

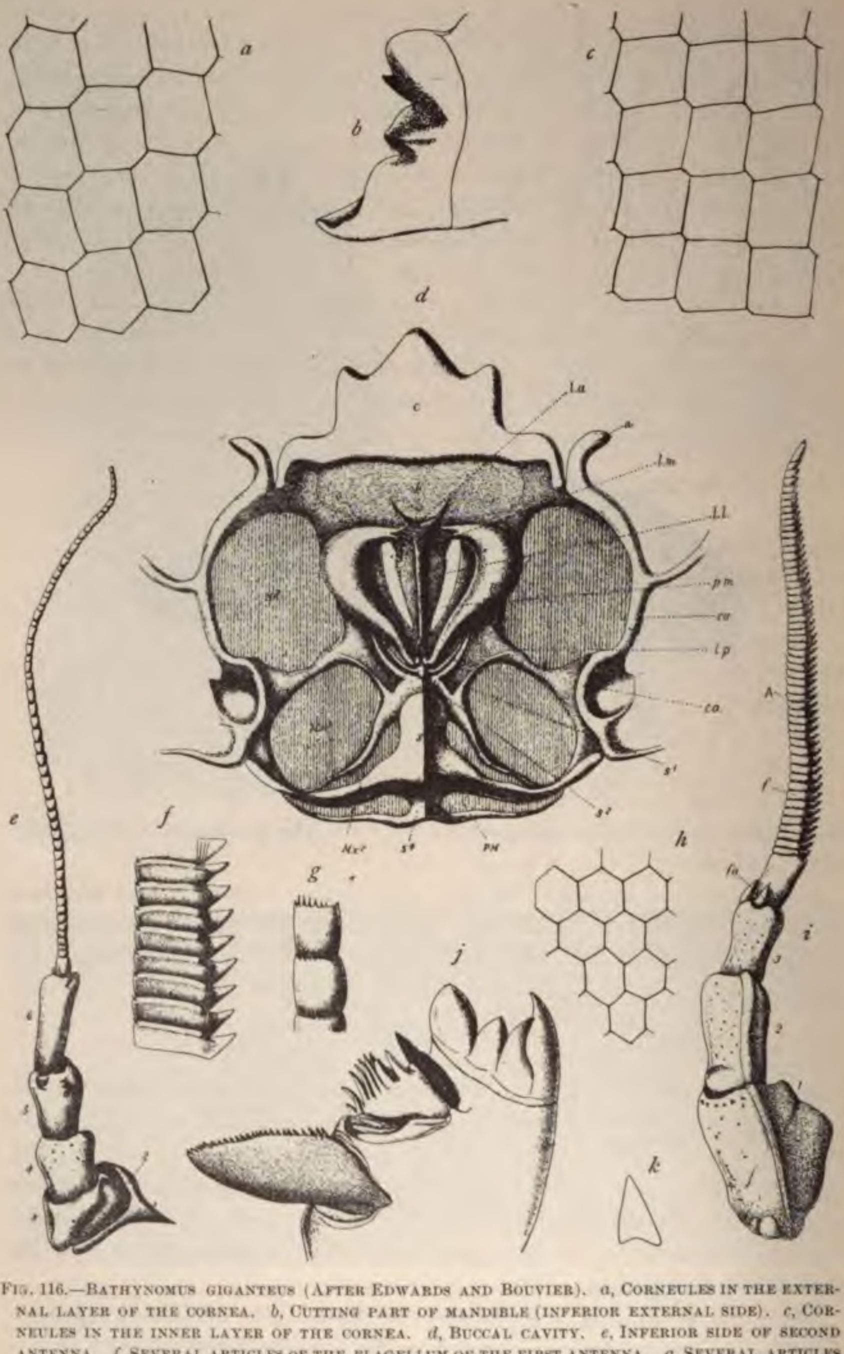

FIG. 116.—BATHYNOMUS GIGANTEUS (AFTER EDWARDS AND BOUVIER). *a*, CORNEULES IN THE EXTERNAL LAYER OF THE CORNEA. *b*, CUTTING PART OF MANDIBLE (INFERIOR EXTERNAL SIDE). *c*, CORNEULES IN THE INNER LAYER OF THE CORNEA. *d*, BUCCAL CAVITY. *e*, INFERIOR SIDE OF SECOND ANTENNA. *f*, SEVERAL ARTICLES OF THE FLAGELLUM OF THE FIRST ANTENNA. *g*, SEVERAL ARTICLES OF THE FLAGELLUM OF THE SECOND ANTENNA. *h*, CORNEULES OF CIROLANA ELONGATA. *i*, FIRST ANTENNA OF LEFT SIDE (INFERIOR FACE). *j*, LEFT MANDIBLE, INFERO-INTERNAL FACE OF THE ANTERIOR PART. *k*, LEFT EYE.

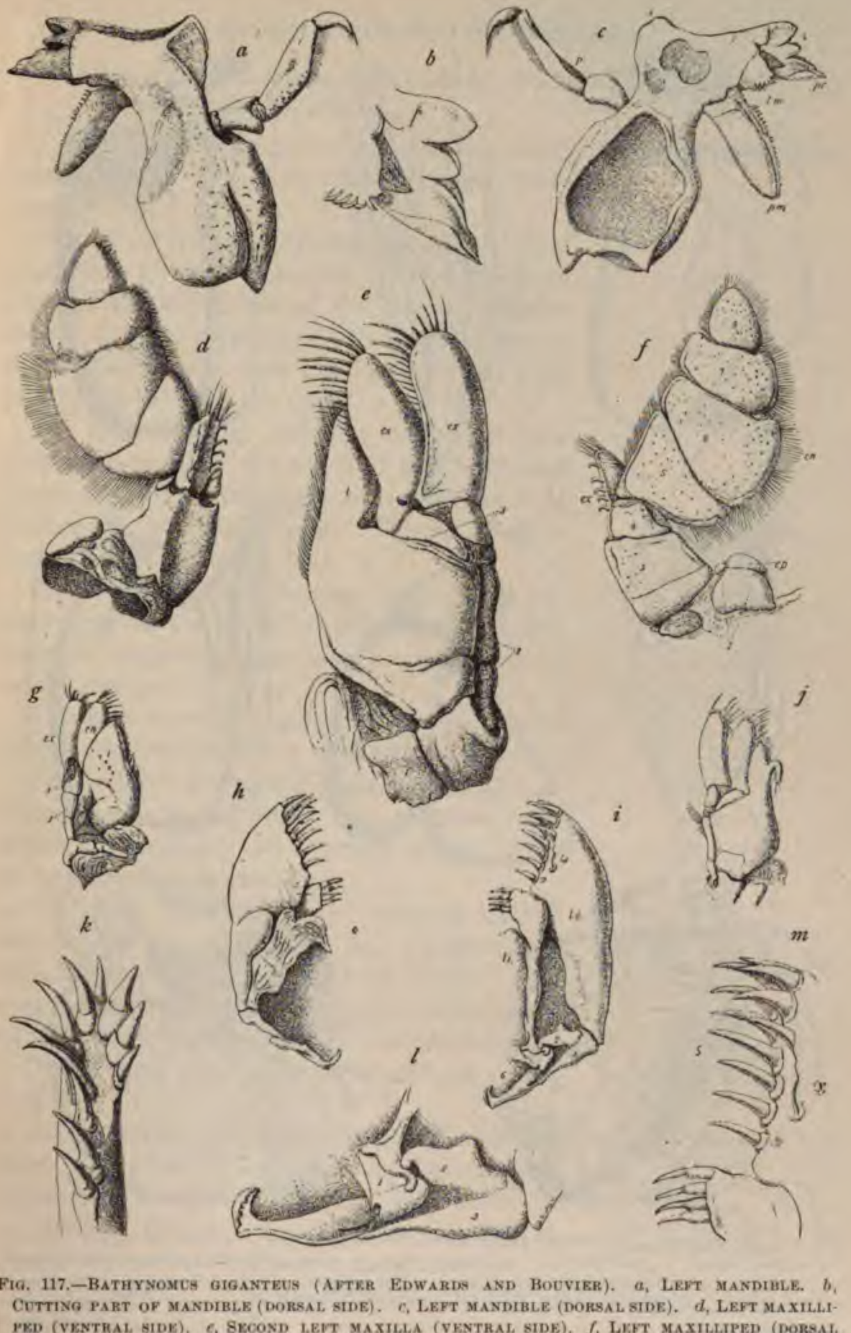

FIG. 117.—BATHYNOMUS GIGANTEUS (AFTER EDWARDS AND BOUVIER). *a*, LEFT MANDIBLE. *b*, CUTTING PART OF MANDIBLE (DORSAL SIDE). *c*, LEFT MANDIBLE (DORSAL SIDE). *d*, LEFT MAXILLIPED (VENTRAL SIDE). *e*, SECOND LEFT MAXILLA (VENTRAL SIDE). *f*, LEFT MAXILLIPED (DORSAL SIDE). *g*, SECOND LEFT MAXILLA (DORSAL SIDE). *h*, FIRST MAXILLA (DORSAL SIDE). *i*, THE SAME (VENTRAL SIDE). *j*, RIGHT SECOND MAXILLA (VENTRAL SIDE). *k*, TIP OF EXTERNAL LACINIA OF FIRST MAXILLA. *l*, BASAL PART OF FIRST MAXILLA. *m*, TIP OF MAXILLARY LACINIÆ OF FIRST MAXILLA.

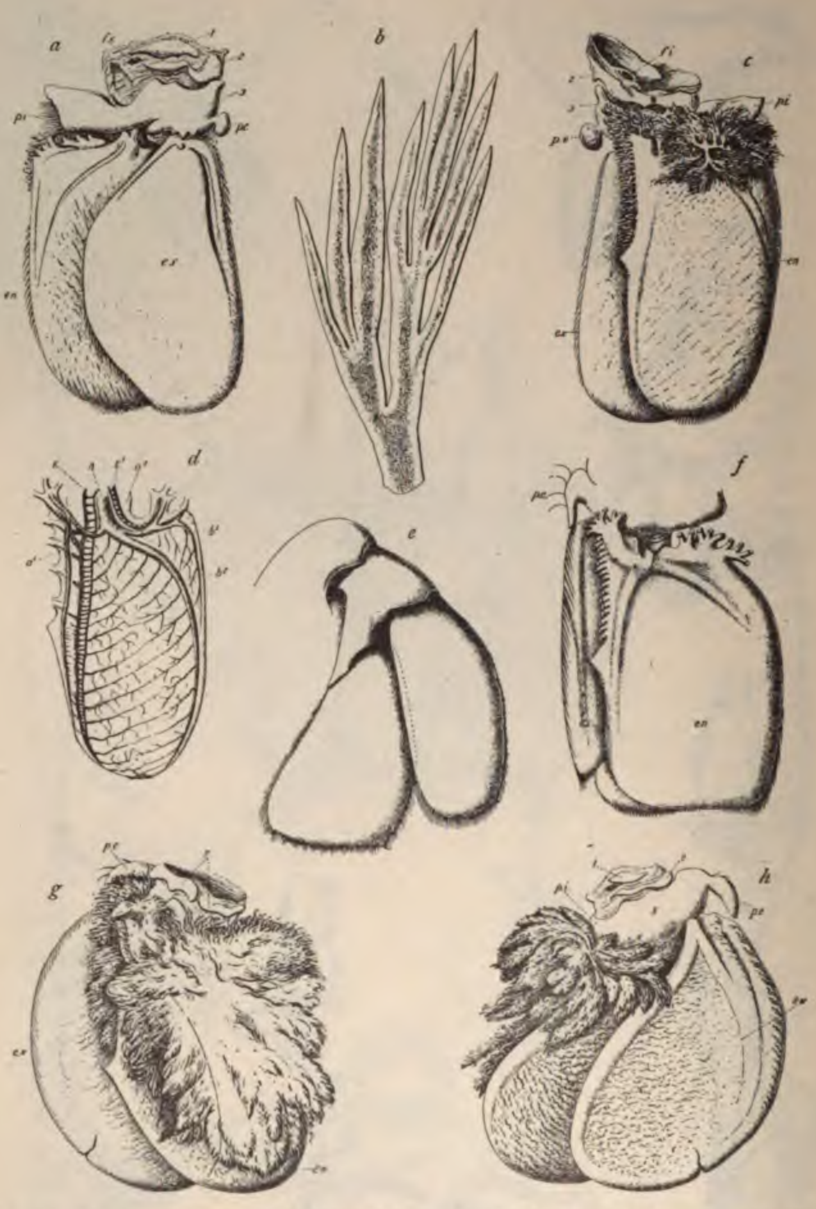

FIG. 118.—*Bathynomus giganteus* (after Edwards and Bouvier). *a*, Left anterior pleopod (ventral side). *b*, Extremity of branchial tuft. *c*, Left anterior pleopod (dorsal side). *d*, Circulation in respiratory endopodite. *e*, Left uropod (inferior side). *f*, Left pleopod of third pair with the trunks of the origin of the branchial tufts. *g*, Posterior left pleopod (anterior side). *h*, The same (posterior side).

COLOPISTHUS PARVUS Richardson.

Colopisthus parvus RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 289–290, pl. XXXVIII, figs. 33–36.

Localities.—Found in low water in the corallines at Bailey Bay, Bermudas, and at Waterloo, Castle Harbor, Bermudas.

Head transversely elliptical, the anterior and posterior margins rounded. The eyes are situated in the middle of the lateral margins at the extreme edge, and are elevated above the surface of the head like knobs. The head is concave between the eyes.

The first pair of antennæ are short, not much longer than the width of the head, and reach the end of the last peduncular joint of the second pair of antennæ. The flagellum is composed of three articles.

The second pair of antennæ are also short, extending to the posterior margin of the first thoracic segment; flagellum is composed of seven articles.

The first thoracic segment is longest. The others are subequal with well-defined epimera.

The first five abdominal segments are all coalesced into one segment. The terminal segment is triangular and strongly keeled along the median longitudinal line.

The inner branches of the uropoda extend beyond the tip of the terminal segment, are broadly oval and fringed with hairs. The outer branches are narrowly oval, about half as wide as the inner branches, and shorter.

Color light yellow, with numerous black dots.

About seven specimens were collected by Prof. A. E. Verrill and party at Bailey Bay, Bermudas, in 1898. Found at low water in corallines. Others were collected in 1901 at Waterloo, on Castle Harbor, Bermudas.

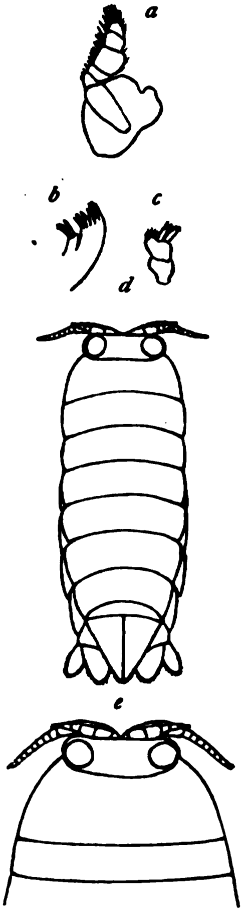

FIG. 119.—COLOPISTHUS PARVUS. *a*, MAXILLIPED. *b*, SECOND MAXILLA. *c*, FIRST MAXILLA. *d*, GENERAL FIGURE. *e*, HEAD AND FIRST TWO THORACIC SEGMENTS.

Type specimen from the Bermudas in Peabody Museum, Yale University. Cat. No. 3179.

Family VI. EXOCORALLANIDÆ.[a]

Clypeus wide and very short, subtriangular, seen from below concealed by the mandibles. Labrum wide and very short, subhorizontal or vertical, seen from below very often concealed by the mandibles. Apical tooth of mandibles of great length; movable lacinia and molar part wanting.

The first maxillæ are robust; the lacinia of the first article is inflated at the apex and unarmed; third article very robust, from the middle to the apex becoming very much narrower and curved somewhat outward, the apex furnished with a single very long and very robust spine curved somewhat inward. Second maxillæ short, narrow, feeble, the apex with two free almost rudimentary laciniæ. Maxillipeds narrow, free; palp with the antepenultimate article elongated, more than twice as long as wide.

26. Genus EXOCORALLANA Stebbing.[b]

ANALYTICAL KEY TO THE SPECIES OF THE GENUS EXOCORALLANA.[c]

a. Eyes moderate or large, some distance apart in the middle at the upper end.

b. Left mandible, seen in position, with the apical part profoundly trifid. Clypeus and labrum very conspicuous.

c. Basal article of the first pair of antennæ narrow, without spine. Head of male ornamented with two or more horn-like tubercles. First segment of body not ornamented with tubercles.

d. Head of male ornamented with three tubercles, two on the dorsal surface and one being the produced median point. Thorax not tuberculated.
Exocorallana tricornis (Hansen)

d'. Head of male ornamented with two dorsal tubercles. Median point not produced in tubercles. Thorax tuberculated.
Exocorallana mexicana, new species.

c'. Basal article of the first pair of antennæ dilated, ornamented with spine at inner exposed angle. Head of male ornamented with four horn-like tubercles. First segment of body ornamented with two tubercles.
Exocorallana sexticornis (Richardson)

b'. Left mandible, seen in position, with the apical part obscurely trifid or forming a single apex. Labium and clypeus partly or very often entirely covered by the mandibles.

c. Basal article of the peduncle of the antennulæ moderately narrow, seen from below not prominent above the basal joints of the antennæ. Last segment of the abdomen not ornamented with basal tubercles near the median line.

d. Head of male ornamented with four tubercles.
Exocorallana quadricornis (Hansen)

d'. Head of male not ornamented with tubercles.
Exocorallana truncata (Richardson)

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[a] See Hansen for characters of family. Vidensk. Selsk. Skr. (6), V, 1890, pp. 311-313, 317, 376.

[b] Fauna and Geography of the Maldive and Laccadive Archipelagoes, II, Pt. 3, 1904, p. 704.

[c] This key, with the exception of three species which are inserted, is taken entirely from Hansen, Vidensk. Selsk. Skr., 6th ser., natur. og. math., Afd. V, 1890, pp. 378, 379.

c′. Basal article of the peduncle of the antennulæ very much dilated, seen from below, so prominent that the basal joints of the antennæ are placed in a transverse cleft moderately deep between the antennulæ and the mandibles. Last segment of the body ornamented with two large basal tubercles situated near the median line.

d. Fourth and fifth segments of the abdomen a little impressed in the dorsal median line, not ornamented with carinæ or tubercles. Last segment of the abdomen with two spines at the apex.
Exocorallana subtilis (Hansen)

d′. Fourth and fifth segments of the abdomen with a deep longitudinal excavation in the dorsal median line, ornamented with many carinæ and tubercles. Last segment of the abdomen with four spines at the apex.
Exocorallana antillensis (Hansen)

a. Eyes very large, contiguous in the middle of the head.

b′. Last segment of the abdomen rather short, widely rounded posteriorly and with a median excavation deep and moderately wide.
Exocorallana fissicauda (Hansen)

b′. Last segment of the abdomen rather long, narrowly rounded posteriorly, with no excavation.

c. Fourth and fifth segments of the abdomen deeply excavate longitudinally in the dorsal median line and ornamented with carinæ. Last segment of the body with an incision in the middle of the side and ornamented on the dorsal surface with two densely setose areas and with two large basal tubercles situated near the median line .... *Exocorallana oculata* (Hansen)

c′. Fourth and fifth segments of the body very little impressed in the dorsal median line, ornamented with no carinæ. Last segment of the abdomen entire at the sides, ornamented on the dorsal surface everywhere with very short hairs remotely scattered........... *Exocorallana warmingii* (Hansen)

EXOCORALLANA TRICORNIS (Hansen).

Corallana tricornis Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 379–381, pl. VI, figs. 4–4 p; pl. VII, figs. 1–1 d.—Richardson, Proceedings U. S. Nat. Mus., XXIII, 1901, p. 518.—Moore, Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 169, pl. IX, figs. 2–5.

Localities.—Cape Catoche, Yucatan; between Delta of the Mississippi and Cedar Keys, Florida; St. Thomas, West Indies; Hucares, Porto Rico; St. Croix, West Indies; Jamaica; Belize, British Honduras; Realejo, Nicaragua, Central America.

Depth.—24–27 fathoms.

Body narrow, elongate, three times longer than wide, 4 mm.; 12 mm. Head wider than long, 1 mm.; 2 mm. with the antero-lateral margins rounded and produced in the middle in a prominent triangular process half a mm. in length, with broad base and apex emarginate or slightly bifid and directed upward, the whole process forming a right angle with the dorsal surface of the head. The eyes are large, conspicuous, and composite and occupy a large portion of the dorsal surface of the head; they are separated from each other by a median groove which extends from the base of the frontal process to the posterior margin of the head. On the posterior portion of the head are two large, prominent tubercles, one on either side of the median groove. The first pair of antennæ have the first two articles almost confluent and scarcely distinguishable; the first is twice as long as the second; the third is also twice as long as the second. The flagellum is composed of eleven articles. The first pair of antennæ extend almost to the middle of the last article of the peduncle of the second pair of antennæ. The second pair of antennæ have the first two articles short, the second a little shorter than the first; the third is nearly twice as long as the second; the fourth and fifth are subequal and each twice as long as the third. The flagellum is composed of sixteen articles. The second antennæ extend to the posterior margin of the second thoracic segment. The maxilliped is composed of seven articles. The palp of the mandibles is composed of three articles. The frontal lamina is longer than wide, and has the anterior margin produced in a long, narrow acute median process.

The first segment of the thorax is slightly longer than any of the others, and has two small inconspicuous tubercles on the anterior portion, one on either side of the median line. The epimera are distinct on all the segments with the exception of the first. They are all crossed obliquely by an arched carina. The outer post-lateral angles of the first two are rounded. In the last four the outer post-lateral angle is produced beyond the posterior margin of the segments.

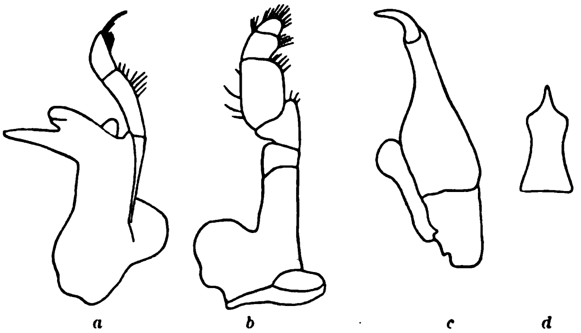

FIG. 120.—EXOCORALLANA TRICORNIS. *a*, MANDIBLE. × 51⅓. *b*, MAXILLIPED. × 51⅓. *c*, FIRST MAXILLA. × 51⅓. *d*, FRONTAL LAMINA. × 51⅓.

All the segments of the abdomen are distinct. The second and third segments have the posterior margins tuberculate; the fourth segment has two transverse rows of tubercles; the fifth segment has three transverse rows of tubercles. In the fourth and fifth segments there is a narrow median depression, this area having only a single longitudinal row of tubercles right in the median line, two for each of the segments. The sixth or terminal segment is triangulate in shape with the apex rounded and furnished with short spines. At the base is a transverse row of tubercles on either side of a shallow median longitudinal groove or furrow. Below the row of tubercles and on either side of this median groove the lateral portions of the segment are somewhat hirsute. A little more than half way between the base and the apex of the segment the lateral margin is incised on either side. The inner branch of the uropoda is broad and posteriorly truncate with the lateral angles rounded; it is as long as the terminal segment of the body. The outer branch is less than half as wide as the inner branch, is produced to a narrowly rounded extremity, and is as long as the outer branch. The inner angle of the peduncle extends a little beyond the lateral incisions of the terminal abdominal segment.

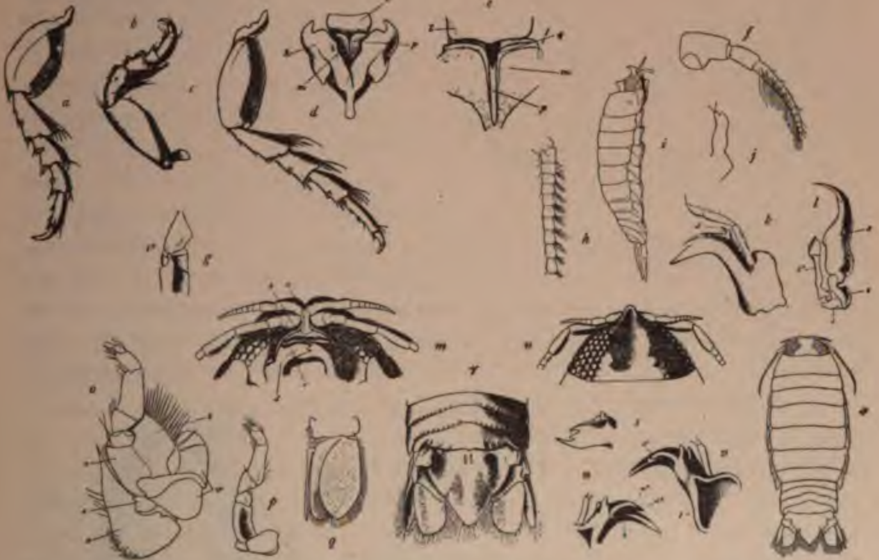

FIG. 121.—EXOCORALLANA TRICORNIS (AFTER HANSEN). *a*, LEFT LEG OF FIFTH PAIR OF MALE. *b*, LEFT LEG OF SECOND PAIR OF MALE. *c*, LEFT LEG OF SEVENTH PAIR OF MALE. *d*, INNER PARTS OF MOUTH, FROM BELOW. *e*, INNER PARTS OF MOUTH (PARAGNATHIA OMITTED). *f*, FIRST ANTENNA OF FEMALE. *g*, MIDDLE PART OF LEFT MAXILLIPED OF MALE. *h*, BASAL PART OF FLAGELLUM OF SECOND ANTENNA OF MALE. *i*, LATERAL VIEW OF MALE. *j*, LEFT MAXILLA OF SECOND PAIR OF MALE. *k*, LEFT MANDIBLE OF MALE. *l*, LEFT MAXILLA OF FIRST PAIR. *m*, VENTRAL VIEW OF HEAD OF FEMALE. *n*, HEAD OF ADULT MALE (DORSAL VIEW). *o*, LEFT MAXILLIPED OF FEMALE. *p*, LEFT MAXILLIPED OF MALE. *q*, LEFT PLEOPOD OF ADULT MALE (SECOND PAIR). *r*, POSTERIOR PART OF ABDOMEN OF ADULT MALE. *s*, DISTAL PART OF LEFT MANDIBLE. *t*, ADULT FEMALE. *u*, DISTAL PART OF LEFT MANDIBLE. *v*, RIGHT MANDIBLE. (ENLARGED.)

The first three pairs of legs are prehensile, the last four pairs ambulatory.

In the female the tubercles on the head are smaller and less prominent, as well as the median frontal process.

Three specimens, a male and two females are from the Gulf of California. They differ from the specimens of the East coast only in having larger tubercles on the abdominal segments on either side of the median longitudinal groove. This new subspecies may be known as *tricornis occidentalis*.

EXOCORALLANA MEXICANA, new species.

Body ovate, a little more than twice as long as wide, 3 mm., 7 mm.

Head wider than long, about twice as wide as long, 1 mm., 2 mm., with the anterior margin widely rounded and the posterior margin straight. Eyes large, composed of numerous ocelli, and separated in front by a distance equal to the length of one eye. Two small tubercles are situated about the middle of the head between the eyes, one on either side of the median line. The first pair of antennæ have the peduncle composed of only two articles, the first article being nearly twice as long as the second. The flagellum, which is composed of ten or eleven articles, extends to the posterior margin of the head or to the end of the fourth article of the peduncle of the second pair of antennæ. The second pair of antennæ have the first three articles of the peduncle short, the second one being the shortest; the fourth and fifth are long and subequal, each being about as long as the first three articles taken together. The flagellum is composed of about twenty-five articles, and extends to the middle of the fifth thoracic segment. The frontal lamina is narrow, elongate, and has the anterior end rounded. The clypeus is short and wide. The mandible is distinctly tridentate, the posterior tooth being the most elongate.

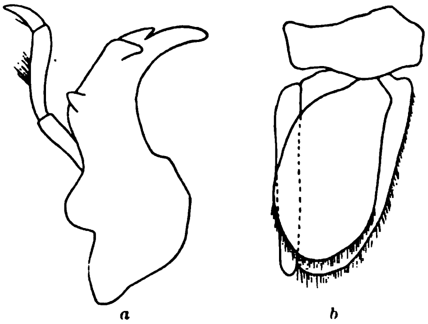

FIG. 122.—EXOCORALLANA MEXICANA. *a*, MANDIBLE. × 51¼. *b*, SECOND PLEOPOD OF MALE × 27¼.

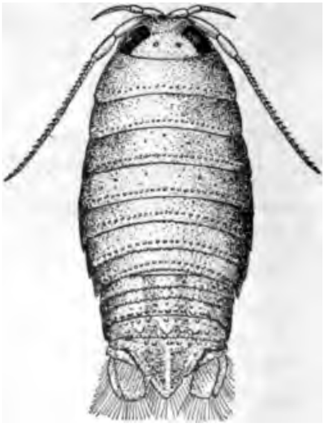

FIG. 123.—EXOCORALLANA MEXICANA. MALE. × 6.

The first segment of the thorax is about one and one-half times longer than any of the three following segments, which are subequal. The fifth, sixth, and seventh segments are subequal and shorter than the preceding segments, and each is furnished with a double or single transverse row of small tubercles close to the posterior margin. The anterior segments are sometimes furnished with a rather indistinct row of tubercles on the posterior margin. The epimera are distinct on all the segments with the exception of the first; the first two are rounded posteriorly, the last four have the outer posterior angle gradually more acutely produced.

The first segment of the abdomen is entirely covered by the last thoracic segment, except a small portion in the middle. The four following segments are nearly subequal in length. The first two (the second and third) have a single transverse row of small tubercles close to the posterior margin. The fourth segment has a double transverse row of tubercles, the posterior row of tubercles being larger. The fifth segment has three transverse rows of tubercles, the middle row being the largest. The sixth or terminal segment of the abdomen is triangulate, with apex rounded and furnished with four spines. There is a lateral incision on either side, a little below the middle transverse line. At the base of the segment is a transverse row of small tubercles. Below this row are two groups of three tubercles each, a group on either side of the median line. There are also two small tubercles on either side of the segment just above the insertion of the uropods. On the posterior part of the segment is a double longitudinal line of small tubercles, one row on either side of the median line. Lateral to these tubercles is a setose area, one on either side. The uropoda are as long as the terminal segment. The inner branch is twice as wide as the outer branch and is truncately rounded and furnished with spines on the posterior margin. The outer branch is obtusely pointed. Both branches are furnished with hairs, as well as the terminal segment of the abdomen.

The type, a male, is from the Gulf of Mexico, station 2406, from a depth of 26 fathoms. Seven other specimens, all males, and thirteen females, are from between the delta of the Mississippi and Cedar Keys, Florida, and from the Gulf of Mexico. The type is in the U. S. National Museum, Cat. No. 32074.

The females differ from the males only in the shorter second antennæ, which extend only to the posterior margin of the third thoracic segment.

EXOCORALLANA SEXTICORNIS (Richardson).

Corallana sexticornis RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 518.

Locality.—Key West, Florida.

Head in the male ornamented with four spines, forming two transverse series of two spines each, the first two being small, the second two very large and long, much longer than the first two and situated behind them. The first antennæ have the basal joint large and dilated, with a spine projecting outward from the inner exposed angle; the flagellum consists of eight joints. The second antennæ with a flagellum of nineteen to twenty-one joints reach the posterior margin of the third thoracic segment. The head of the male is excavate above and deeply sunken below the level of the dorsal surface of the body. The head of the female is unornamented, with only a slight indication of two small tubercles in the place where the large spines are situated on the head of the male. The basal joints of the first antennæ of the female are large and dilated, but without the prominent spine characteristic of the male.

The first thoracic segment in the male is ornamented with two small tubercles situated close together on the anterior portion. These tubercles are wanting in the female. The posterior segments of the thorax and the abdominal segments are densely tubercular. The terminal segment of the body is pointed posteriorly, and fringed with hairs. The uropoda are about as long as the terminal segment, the outer branch narrow, the inner branch wide; both are fringed with hairs and armed with a few spines.

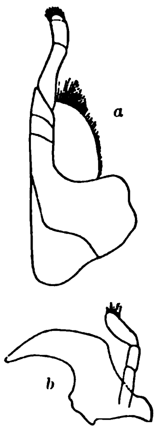

FIG. 124.—EXOCORALLANA SEXTICORNIS. *a*. MAXILLIPED. × 39. *b*. MANDIBLE. × 39.

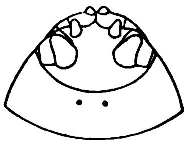

FIG. 125.—EXOCORALLANA SEXTICORNIS. HEAD AND FIRST THORACIC SEGMENT.

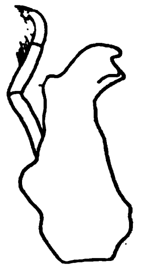

FIG. 126.—EXOCORALLANA SEXTICORNIS. MANDIBLE. × 51½.

One male and a number of females were collected by Henry Hemphill at Key West, Florida.

Type.—Cat. No. 13540, U.S.N.M.

EXOCORALLANA QUADRICORNIS (Hansen).

Corallana quadricornis HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, p. 382, pl. VII, fig. 3.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 518; Trans. Conn. Acad. Sci., XI, 1902, 290.

Localities.—St. Thomas, West Indies; Bermudas, at the Flatts; at Long Bird Island in the cavities of a massive, black keratose sponge, living on the grassy sand flats at low tide; Castle Harbor, in the same sponge.

This species is very similar to *E. tricornis*, but differs in the following important characters: The clypeus, seen from below, is very narrow and concealed for the most part; the labrum is concealed by the mandibles. Half of the distal part of the mandibles is very prominent and obscurely trifid. The last segment of the abdomen is a little more impressed at the sides than in *E. tricornis*. The abdomen is less hairy, the apical part of the last segment less convex, ornamented, however, with four apical spines.

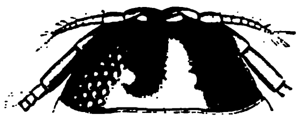

FIG. 127.—EXOCORALLANA QUADRICORNIS (AFTER HANSEN). HEAD. (ENLARGED.)

The male has the head excavated as in *E. tricornis*, and ornamented with two small frontal tubercles rather closer together, and two large suboccipital tubercles more widely separated. The head of the female is as in *E. tricornis*. The flagellum of the second pair of antennæ in the male is composed of sixteen articles; in the female of about twenty articles.[a]

EXOCORALLANA TRUNCATA (Richardson).

Corallana truncata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 825; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 165–166.

Localities.—Catalina Island, California; off Magdalena Bay, Lower California.

Body elongate, about three and a half times longer than wide; color yellow.

Head with a small median point. Eyes large, situated but a little distance apart. First pair of antennæ, with a flagellum of about nine articles, extend to the antero-lateral angle of the first thoracic segment. Second pair of antennæ broken in specimen.

First segment of the thorax is as long as the head, and about one and a half times longer than any of the other segments. Epimera of the second and third segments narrow; those of the remaining segments very broad.

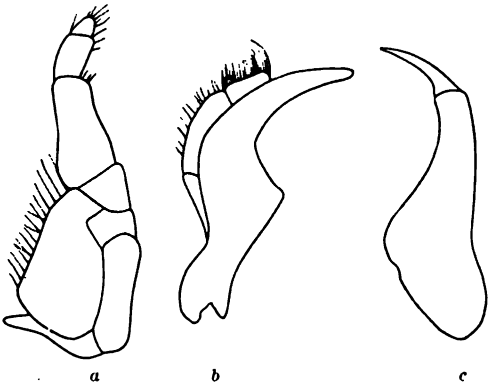

FIG. 128.—EXOCORALLANA TRUNCATA. *a*, MAXILLIPED. × 27½. *b*, MANDIBLE. × 27½. *c*, FIRST MAXILLA (OUTER LOBE). × 27½.

The first abdominal segment is almost entirely covered by the last thoracic segment. The second, third, and fourth segments are

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[a] The above description is adapted from the following one of Hansen's:

Diagn. Speciei præcedenti (*C. tricornis*) valde affinis, characteribus sequentibus imprimis differt. Clypeus, infra visus, perangustus et ex parte obtectus; labrum a mandibulis obtectum. Mandibularum pars distalis dimidia sat alte eminens, obscurius trifida. Segmentum ultimum ad latera versus paulo magis impressum quam in specie præcedente (*C. tricornis*).

Mas: Caput ut in specie præcedente excavatum, cornibus duobus frontalibus minoribus, minus distantibus et cornibus duobus majoribus, suboccipitalibus, magis distantibus ornatum.—Long. 6, 3 mm.

Femina: Caput ut in specie præcedente.—Long. 6, 8 mm.

Descr. Hæc species *Cor. tricorni* simillima; characteres omnes graviores in diagnosi commemorati sunt. Præterea differt cauda minus hirsuta, parte apicali segmenti ultimi minus convexa, spinis tamen 4 apicalibus ornata. (Flagellum antennarum in mare 16—articulatum, in femina c. 20—articulatum.)—HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, p. 382.

tuberculated on their posterior margins. The fifth segment is also tuberculated, the tubercles on either side of the median line of tubercles being larger and more conspicuous. At the base of the terminal segment are four tubercles, the two center ones being the largest. The terminal segment is subtriangular with truncate apex. The posterior margin is armed with spines. The inner branch of the uropoda is truncate posteriorly and armed with spines; it is about twice as broad as the outer branch, which is lanceolate in shape.

The type specimen is from Catalina Island, California; collected by Dr. J. G. Cooper.

Type.—Cat. No. 22566, U.S.N.M.

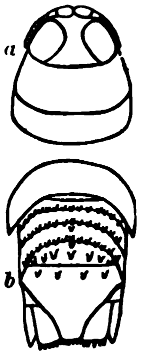

FIG. 129.—EXOCORALLANA TRUNCATA. × 13½. *a*, HEAD. *b*, ABDOMEN AND LAST THORACIC SEGMENT.

EXOCORALLANA SUBTILIS (Hansen).

Corallana subtilis HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 382-383, pl. VII, figs. 3-3c.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 519.

Locality.—St. Thomas, West Indies.

A single young specimen in the process of ecdysis was taken, and on that account is rather different from other species in appearance.

The front of the head is produced in a rather large triangular process. The first pair of antennæ have the basal article of the peduncle strongly dilated when seen from above; when seen from below it projects in such a way that the basal articles of the second antennæ are placed in a rather deep cleft between the first pair of antennæ and the mandibles. The first pair of antennæ have the second article of the peduncle slender; the flagellum is composed of about seven articles. The eyes are slightly granulated.

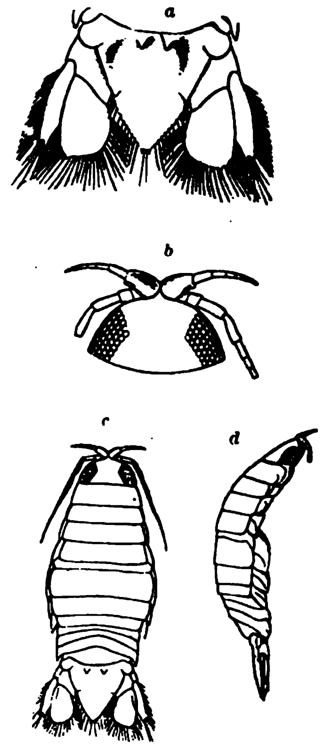

FIG. 130.—EXOCORALLANA SUBTILIS. (AFTER HANSEN). *a*, POSTERIOR PART OF ABDOMEN. × 16. *b*, HEAD. × 19. *c*, YOUNG SPECIMEN TAKEN IN PROCESS OF ECDYSIS. × $\frac{23}{2}$. *d*, LATERAL VIEW OF SAME (RIGHT SIDE).

The frontal lamina is a little longer than wide, somewhat narrower toward the apex, with the apex rounded and superficially excavated.

The clypeus is very narrow, partly concealed; the labrum is concealed.

The last segment of the abdomen is somewhat longer than in *E. quadricornis*, being a fourth part wider than long, bare above, and ornamented on the dorsal surface near the base with two large tubercles, separated a little; the sublateral impressions are deep; the apex is furnished with two spines.

The uropoda are wider than in *E. quadricornis;* the branches are ornamented with some long hairs and a few spines; the peduncle has the inner angle short, occupying about a third of the inner branch.

The color is dark black; the last segment of the abdomen and the uropoda are brown, ornamented with branching black spots.[a]

Two specimens, both males, from Florida, in the collection of the U. S. National Museum, I have referred to this species with some hesitation, as they lack the two large tubercles at the base of the terminal abdominal segment. They agree in other respects with Hansen's description of this species, but as Doctor Hansen's only specimen was a young specimen, very likely a female and taken in the process of ecdysis, I would hesitate to make a new species until I had more material.

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[a] The above description is adapted from the following description of Hansen's:

Diagn. Feminæ *Cor. quadricornis* subsimilis, tamen imprimis differt characteribus sequentibus. Oculi leviter granulati. Antennularum articulus basalis pedunculi pronus visus valde dilatatus, supinus visus ita prominens, ut articuli basales antennarum in rima sat profunda inter antennulas et mandibulas positi sint. Segmentum ultimum caudæ dorso prope basin nodis duobus magnis, paulum distantibus ornata, impressionibus sublateralibus profundis, apice spinis 2 instructo.—Long. 4, 7 mm.

Descr. Specimen singulum juvenile in mutatione cutis captum et ob eam causam a speciebus ceteris habitu sat diversum vidi. Characteres præcipui in diagnosi exhibiti sunt; præterea characteres sequentes commemorare possum.

Frons ante in processum trigonum sat magnum producta.

Lamina frontalis paulo longior quam latior, ad apicem versus nonnihil angustata, apice rotundato, superficie excavata.

Clypeus perangustatus, ex parte detectus, labrum obtectum. Antennulæ articulo secundo pedunculi gracili, flagello c. 7-articulato.

Segmentum ultimum caudæ nonnihil longius quam in speciebus præcedentibus (*C. quadricornis*), quarta parte latius quam longius, superne nudum.

Uropoda fere latiora quam in speciebus præcedentibus; rami setis nonnihil longioribus et spinis paucioribus ornati; scapus angulo interiore breviore, circiter tertiam partem rami interioris occupans.

Color fusco-piceus; segmentum ultimum caudæ et uropoda brunnea, maculis ramosis nigris ornata.—HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 382-383.

EXOCORALLANA ANTILLENSIS (Hansen).

Corallana antillensis HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 383–384, pl. VII, figs. 4–4i.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 519.

Localities.—Key West, Florida; St. Thomas, West Indies.

On reefs, low tide.

Body oblong-ovate, a little more than three times longer than wide, 5 mm.: 16 mm.

Head wider than long, 2 mm.: 4 mm., with the anterior margin bisinuate on either side of a small median point. The eyes are large and composite, but are not contiguous, being separated by a distance equal to half the length of one eye. The basal article of the antennæ is very much dilated and very large; the second article is fused with the first; the third article is small and narrow, half as long as the first and about one-third as wide. The flagellum is composed of ten articles. The first antennæ extend to the middle of the fifth article of the peduncle of the second antennæ. The second pair of antennæ have the first two articles short and subequal; the third article is equal in length

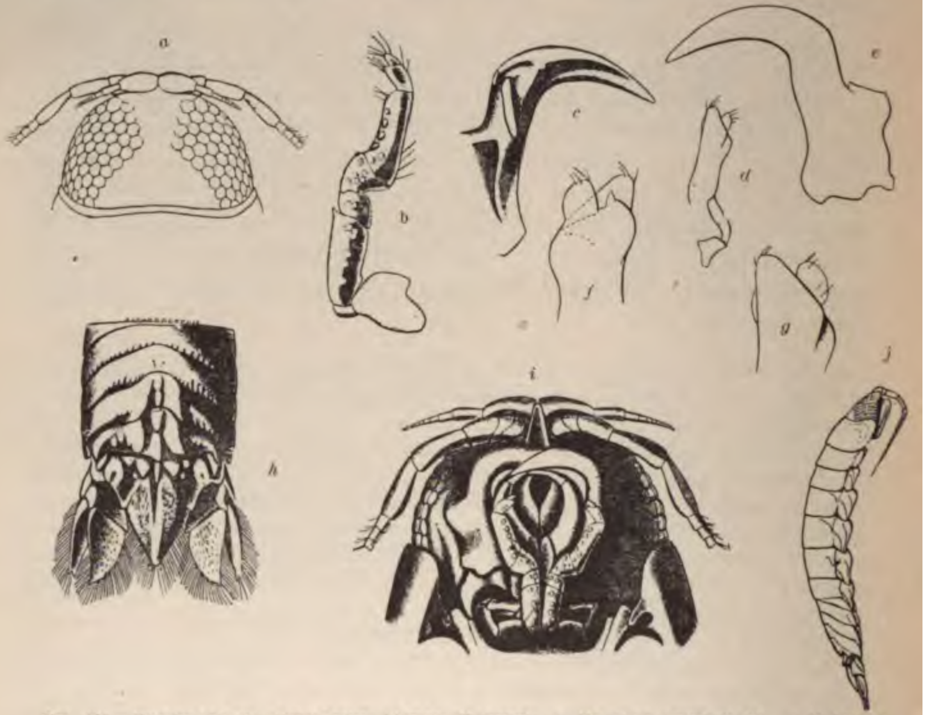

FIG. 131.—EXOCORALLANA ANTILLENSIS (AFTER HANSEN). *a*, HEAD OF ADULT MALE. × 11 (FROM ABOVE). *b*, LEFT MAXILLIPED OF SAME. × 24. *c*, LEFT MANDIBLE, PALP OMITTED (VENTRAL SIDE). × 24. *d*, LEFT MAXILLA (SECOND PAIR). × 24. *e*, LEFT MANDIBLE (BASAL PART OMITTED). × 24 (FROM ABOVE). *f*, DISTAL PART OF LEFT MAXILLA OF SECOND PAIR (VENTRAL SIDE). × 59. *g*, DISTAL PART OF SAME (FROM ABOVE). *h*, ABDOMEN. × 6. *i*, HEAD (VENTRAL SIDE). × 11. *j*, ADULT MALE (LATERAL VIEW). $\times \frac{11}{4}$.

to the first two taken together; the fourth and fifth are subequal and each is nearly twice as long as the third. The flagellum is composed of thirty-two articles. The second pair of antennæ extend to the posterior margin of the third thoracic segment. The maxilliped is composed of seven articles. The palp of the mandibles is composed of three articles. The frontal lamina is narrow and long, and has the anterior extremity rounded.

The first segment of the thorax is nearly twice as long as any of those following. The seventh is a little shorter than the sixth. The epimera are distinct on all the segments with the exception of the first. An arched carina crosses all the epimera obliquely. The outer post-lateral angle of the first two epimera is rounded; that of the last two acutely produced beyond the posterior margin of the segments.

The first segment of the abdomen is partly concealed by the seventh thoracic segment. The posterior margin of the second, third, fourth, and fifth segments is tuberculate. On all of these segments there is a median depression, in the center of which is a small tubercle, one for each segment, with the exception of the fifth, which has two tubercles in longitudinal series. The sixth or terminal segment is triangular with apex acute and furnished with a few short spines. There is a median longitudinal depression extending the length of the segment, on either side of which the dorsal surface is hirsute. At the base of the segment are two tubercles, one on either side of the median depression. On either side of these, near the lateral margin and at the base of the segment, are two other tubercles, the one nearest the lateral margin being a little anterior to the other. Halfway between the base and the apex of the segment the lateral margin is cleft on either side. The inner branch of the uropoda is wide and has the outer post-lateral angle produced in an acute tooth; the inner posterior margin is crenulate and armed with spines. The outer branch is as long as the inner branch, is half as wide, and is produced in an extremity terminating in two subequal teeth. The inner angle of the peduncle extends a

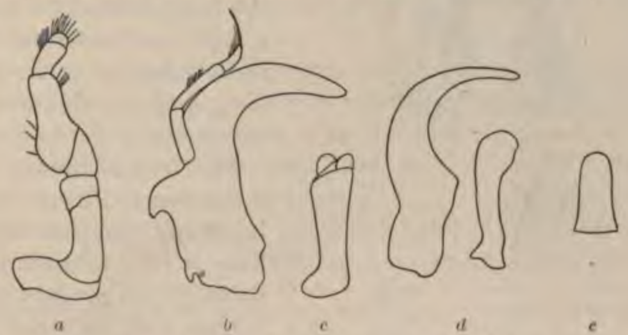

FIG. 132.—EXOCORALLANA ANTILLENSIS. *a*, MAXILLIPED. × 27½. *b*, MANDIBLE. × 27½. *c*, SECOND MAXILLA. × 27½. *d*, FIRST MAXILLA (OUTER AND INNER LOBE). × 27½. *e*, FRONTAL LAMINA. × 27½.

little beyond the incision in the lateral margin of the terminal abdominal segment.

The first three pairs of legs are prehensile, the last four pairs ambulatory.

EXOCORALLANA FISSICAUDA (Hansen).

Corallana fissicauda HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 385–386, pl. VII, figs. 5–5d.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 519.

Locality.—West Indies.

The body is almost three times longer than wide; the thorax is somewhat longer than the abdomen.

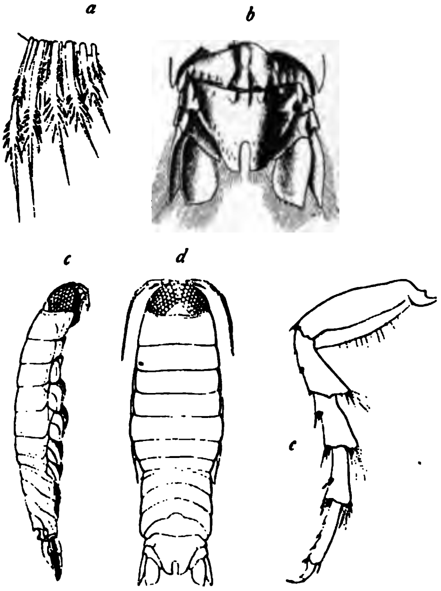

FIG. 133.—EXOCORALLANA FISSICAUDA (AFTER HANSEN). *a*, FEMALE. *b*, LATERAL VIEW. *c*, LEG OF SEVENTH PAIR. *d*, APEX OF FIFTH ARTICLE OF SEVENTH LEG, BEARING SETÆ. *e*, POSTERIOR PART OF ABDOMEN WITH UROPODA. (ENLARGED.)

The front of the head has the margin straight, the median process is bent, having almost disappeared.

The eyes are black, very large, occupying the entire surface of the head with the exception of a small median area at the posterior margin; the ocelli are very large, semispherical, and formed as in *E. warmingii.*

The frontal lamina is almost three times longer than wide, becoming narrower from the base to the middle, excavated through the greater part of its length, with the apical part flat, and rounded anteriorly. The lamina seen from the side is curved outward and near the apex curved inward.

The clypeus seen from below is very manifest for the most part; the labrum is concealed.

The first pair of antennæ extend to about the apex of the penultimate article of the peduncle of the second pair of antennæ; the peduncle has the first article somewhat stout, narrow, however, when seen from above and below; the second article is somewhat shorter than the first and more slender; the flagellum is somewhat shorter than the peduncle and is composed of about eight articles.

The second pair of antennæ are of the usual structure.

The mandibles are large, robust; the distal part of the left mandible is very conspicuous, forming a single cone.

The maxillipeds are almost as in *E. antillensis.*

The segments of the thorax are almost as in *E. antillensis;* the postmarginal furrow is well defined only in the seventh segment; in the fourth, fifth, and sixth segments it is somewhat distinct, formed principally of points.

The epimera are almost as in *E. antillensis.*

The first five segments of the abdomen are a little more smoothly formed than in *E. antillensis.*

The last segment of the abdomen is short, about two-fifths wider than long, posteriorly widely rounded, not furnished with spines, but furnished with a deep and rather wide median incision, the lateral margin is entire; the dorsal surface is rather convex, not furnished with densely setose areas, but ornamented with very short, scattered hairs near the lateral margins, and furnished near the base with a median excavation which has a carina in a rather short fundus, and ornamented with acute tubercles rather close together and rather small, and with lateral tubercles somewhat smaller than in *E. antillensis* and not furcate.

The uropoda extend some distance beyond the abdomen and are furnished with hairs as in *E. antillensis;* the branches are equal in length; the inner branch is rather wide, with the posterior part of the inner margin somewhat curved outward, and furnished with a few spines; the apex is a little produced and acute.

The peduncle has the inner angle extending a little beyond a third part of the inner branch. The color is brownish yellow.[a]

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[a] The above description is adapted from the following one of Hansen's:

Diagn. Clypeus, supinus visus, ex parte perspicuus, labrum obtectum. Antennularum articulus basalis nonnihil incrassatus, pronus et supinus visus angustus. Segmenta 5 anteriora caudæ fere ut in *Cor. antillensi.* Segmentum ultimum caudæ breve, postice late rotundatum et incisura media profunda, sat lata, instructum, margine laterali non inciso, dorso ad basin nodis et nodulis ornato, areis spisse setosis nullis. Uropoda caudam longe superantia, structura fere solita. Long. 11 mm.

Corpus fere triplo longius quam latius; truncus cauda aliquanto longior.

Frons margine subrecto, processu medio inflexo, fere evanido.

Oculi nigri, permagni, superficiem totam capitis præter aream minorem mediam ad marginem posteriorem occupantes; ocelli permagni, semiglobosi, ut in *C. Warmingii* formati.

Lamina frontalis fere triplo longior quam latior, a basi ad mediam angustata, per longitudinem majorem excavata, parte apicali subplana, ante rotundata. Lamina a latere visa excurvata et prope apicem incurva.

Clypeus supinus visus ex parte perspicuus; labrum obtectum.

Antennulæ circiter apicem articuli penultimi pedunculi antennarum attingentes; pedunculus articulo primo nonnihil incrassato, prono et supino viso tamen angusto, articulo secundo aliquanto breviore quam primo, graciliore; flagellum pedunculo aliquanto brevior, c. 8-articulatum.

Antennæ structura solita. Mandibulæ magnæ, robustæ, pars distalis mandibulæ sinistræ sat alte eminens, ut in speciebus sequentibus conum singulum formans.

Maxillipeds fere ut in *C. antillensi.*

Segmenta trunci fere ut in *C. antillensi;* stria postmarginalis solum in segmento

EXOCORALLANA OCULATA (Hansen).

Corallana oculata HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 386-387, pl. VII, figs. 6-6b.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 519.

Locality.—West Indies.

The body is about three times longer than wide; the last four segments of the thorax, especially toward the posterior margin, and the second to the fifth segments of the abdomen in the male are nearly bare, in the female they are rough and furnished with very short stiff hairs; the thorax in the male is a little longer and in the female is somewhat longer than the abdomen.

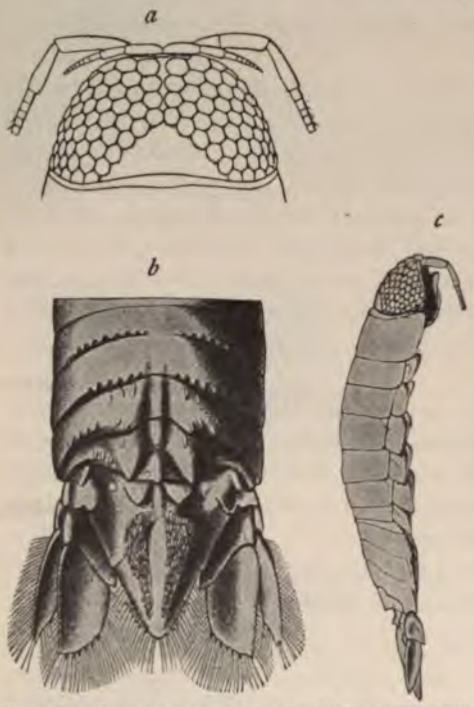

FIG. 134.—EXOCORALLANA OCULATA (AFTER HANSEN). *a*, HEAD OF ADULT MALE. *b*, ABDOMEN OF ADULT MALE. *c*, LATERAL VIEW OF ADULT MALE. (ENLARGED.)

The front of the head is as in *E. fissicauda.*

The eyes are almost as in *E. fissicauda*, being somewhat larger in the male and more convex than in the female; the ocelli are very large in the male and very convex, in the female they are a little less convex.

The frontal lamina is as in *E. fissicauda.*

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septimo bene definito, in segmentis sexto et quinto et quarto paulum distincta, imprimis e punctis formata.

Epimera et pedes fere ut in *C. antillensi.*

Segmenta 5 anteriora caudæ paulo levius sculpta quam in *C. antillensi.*

Segmentum ultimum caudæ abbreviatum, circiter $\frac{2}{5}$ latius quam longius, postice late rotundatum, non spinosum, ibique incisura profunda et sat lata ornatum, margine laterali integro; dorsum sat convexum, areis nullis spisse setosis instructum, setis brevissimis remotius sparsis ad margines laterales versus ornatum, excavatione basali media in fundo breviore carinata, nodis acutis sat approximatis nonnihil minoribus, nodis lateralibus aliquanto minoribus quam in specie præcedente et non furcatis instructum.

Uropoda caudam valde superantia, ut in *C. antillensi* ciliata; rami inter se æquilongi; ramus interior sat latus, margine postero-interiore aliquantum excurvato spinis nonnullis instructo, apice paulum producto, acuto. Scapus angulo interiore paulum ultra tertiam partem rami interioris occupans.

Color flavo-brunneus.—HANSEN, Vidensk. Selsk. Skr. (6), V, 1890, pp. 385-386.

The clypeus is very narrow, very manifest when seen from below; the labrum is partly concealed by the mandibles.

The first and second pair of antennæ are as in *E. fissicauda.*

The mandibles in the male are more prominent than in the female.

The maxillipeds are furnished below with numerous little knots, for the most part acute.

The first two or three segments of the thorax have rather distinct postmarginal furrows; the furrows on the posterior segments in the male are quite distinct, in the female they are obscured more or less by hairs.

The epimera and the legs are almost as in *E. antillensis.*

The five anterior segments of the abdomen are formed almost as in *E. antillensis.* The last segment of the abdomen is almost as in *E. antillensis*, but differs from that species especially in having the median excavation at the base shorter, the lateral tubercles rather narrower, the apex furnished with five spines, and subacute, the lateral margin not incised in the middle, and the dorsal surface furnished with two thickly setose areas.

The uropoda extend somewhat beyond the abdomen; the inner branch extends a little beyond the outer branch, is almost twice as long as wide, and has the inner posterior margin rather curved, furnished with spines and long hairs, the apex a little produced and acute. The peduncle has the inner angle somewhat exceeding a third part of the inner branch.

The color is a brownish yellow. The male appendix is almost as in *E. tricornis.* [a]

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[a] The above description is adapted from the following one of Hansen's:

Diagn. *Cor. fissicaudæ* valde similis, segmento ultimo caudæ fere ut in *C. antillensi* formato, longiore, apice subacuto, margine laterali in medio non inciso, dorso areis duabus spisse setosis instructo, imprimis ab ea specie diversa. Long. maris 9, 7 mm., long. feminæ 11, 5 mm.

Corpus circiter triplo longius quam latius; segmenta 4 posteriora trunci imprimis ad marginem posteriorem versús et segmenta 2–5 caudæ in mare fere nuda, in femina scabra, setis brevissimis, rigidis instructa; truncus in mare paulo longior et in femina nonnihil longior quam cauda.

Frons ut in specie præcedente (*C. fissicauda*).

Oculi fere ut in specie præcedente, in mare nonnihil majores et plus convexi quam in femina; ocelli permagni in mare valde convexi, in femina paulo minus convexi.

Lamina frontalis ut in *Cor. fissicauda.*

Clypeus perangustus, supinus visus perspicuus; labrum ex parte a mandibulis tectum.

Antennulæ et antennæ ut in *Cor. fissicauda.*

Mandibulæ in mare plus prominentes quam in femina.

Maxillipedes subtus nodulis compluribus ex parte acutis armati.

Segmenta duo vel tria anteriora trunci stria postmarginali paulum distincta;

EXOCORALLANA WARMINGII (Hansen).

Corallana warmingii Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 387-388, pl. VII, figs. 7-7f.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 519.

Localities.—Off Cape Catoche, Yucatan; latitude 17° 47′ south, longitude 35° 17′ west.

Depth.—24 fathoms.

Body oblong-ovate, three times longer than wide, 3 mm.:9 mm. Head wider than long, 1 mm.:2 mm., with the anterior margin widely rounded. Eyes large, composite, contiguous, and occupying the greater part of the dorsal surface of the head. The first pair of antennæ have the first two articles confluent and scarcely to be distinguished from each other; they are subequal in length; the third article is equal to the second in length. The flagellum is composed of nine articles. The first antennæ extend almost to the middle of the fifth peduncular article of the second antennæ. The first two articles of the second pair of antennæ are short, the second one being a little shorter than the first; the third article is about equal to the first two taken together; the fourth and fifth are subequal and each is twice as long as the third. The flagellum is composed of twenty-five articles. The second antennæ extend almost to the posterior margin of the third thoracic segment. The maxilliped is composed of seven articles. The mandible has a palp of three articles. The frontal lamina is narrow and has the anterior margin rounded.

The first segment of the thorax is twice as long as any of the four following segments; the sixth and seventh segments are shorter than the fifth, the seventh being very short. The epimera of all the segments, with the exception of the first, are distinct, the last four being crossed obliquely by an arched carina. The outer post-lateral angles of the first two are rounded, those of the last two acutely produced beyond the posterior margin of the segments.

The first segment of the abdomen is entirely concealed by the last thoracic segment. The posterior margin of the four following seg-

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segmenta posteriora stria in mare bene distincta, in femina a setis plus minusve abscondita.

Epimera et pedes fere ut in *Cor. antillensi.*

Segmenta 5 anteriora fere ut in *C. antillensi* sculpta.

Segmentum ultimum caudæ fere ut in *C. antillensi*, excavatione media basali breviore, nodis lateralibus magnis angustioribus, apice 5 spinoso imprimis ab ea specie discrepans.

Uropoda caudam nonnihil superantia; ramus interior ramum exteriorem paulum superans, fere duplo longior quam latior, margine postero-interiore sat excurvato, sat spinoso, longe ciliato, apice paulum producto, acuto. Scapus angulo interiore partem tertiam basalem rami interioris nonnihil superante.

Color flavo-brunnescens. Appendix masculina fere ut in *C. tricorni.*—Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 386-387.

ments is slightly tuberculate. The terminal segment is perfectly smooth on its dorsal surface, is produced to a narrow extremity, which is rounded, and has the posterior margin crenulate, the crenulations at the apex taking the form of five teeth. The inner branch of the uropoda is broad, with the inner angle of the posterior end broadly rounded, the outer angle terminating in an acute tooth; the posterior and exterior margins are slightly crenulate. The outer branch is narrow, less than half the width of the inner branch, is a little shorter

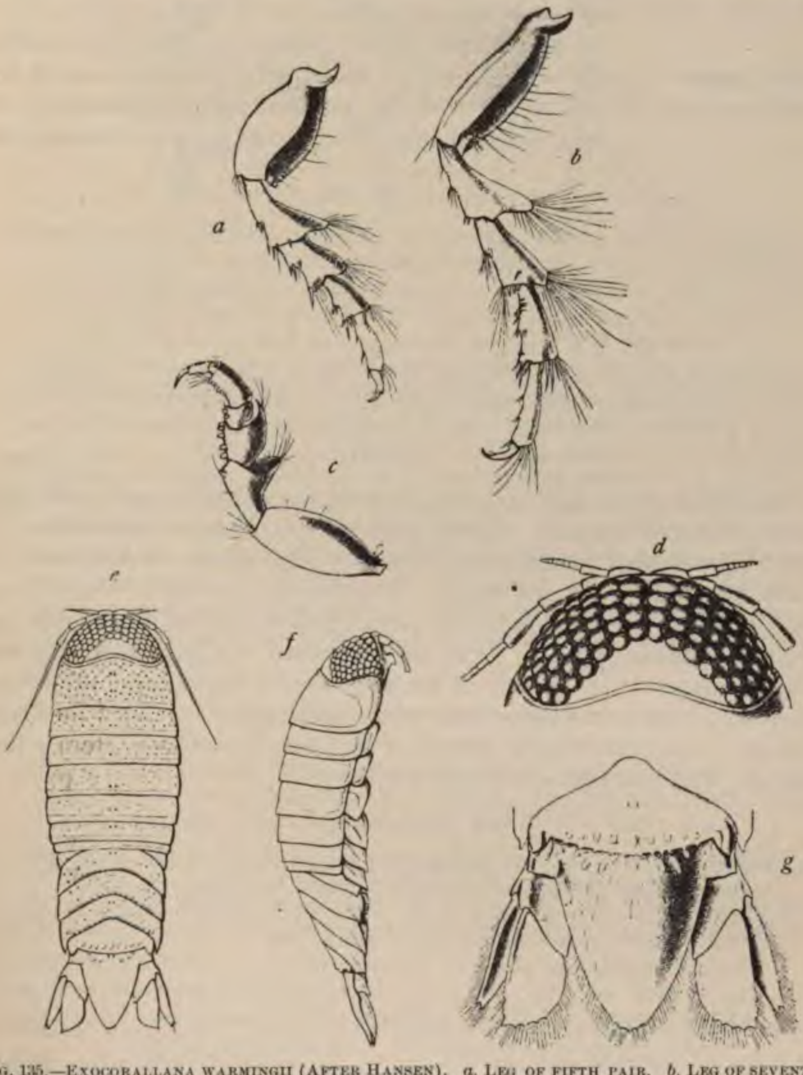

Fig. 135.—Exocorallana warmingii (after Hansen). *a*, Leg of fifth pair. *b*, Leg of seventh pair. *c*, Leg of second pair. *d*, Head. *e*, Dorsal view of male. *f*, Lateral view of male. *g*, Posterior part of abdomen. (Enlarged.)

than the inner branch, and terminates in two acute teeth, the inner one being the larger and longer one.

The first three pairs of legs are prehensile, the last four pairs ambulatory.

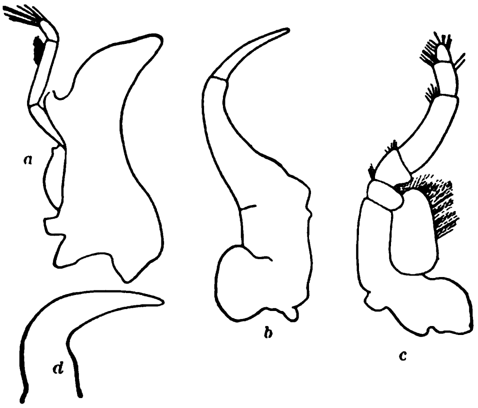

FIG. 136.—EXOCORALLANA WARMINGII. *a*, MANDIBLE. × 38¾. *b*, OUTER LAMELLA OF FIRST MAXILLA. × 38¾. *c*, MAXILLIPED. × 38¾. *d*, TIP OF MANDIBLE. × 38¾.

Family VII. CORALLANIDÆ.[a]

Mandibles becoming narrower toward the anterior part and manifestly directed inward. Apical part narrow, hidden under the clypeus, labrum, and paragnathia. Cutting edge short. Apical tooth of mandibles not greatly produced. Movable lacinia small or vanishing; molar part very often vanishing, sometimes well developed. Apex of second maxillæ simple. First maxillæ with the lacinia of the first article unarmed; the lacinia of the third article becoming more or less narrower from about the middle to the apex; apex furnished with few spines. Antepenultimate article of the maxillipeds not longer than broad. Labrum small, transverse.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY CORALLANIDÆ.

a. First maxillæ with the apex of the third article furnished with more than one spine. Lacinia of first article narrow, elongate, with apex unarmed.

  b. First maxillæ with the apex of the third article furnished with two spines. Molar part of mandibles wanting. Second maxillæ simple; laciniæ not distinct. Clypeus long and wide, semilunar in shape....Genus *Alcirona* Hansen

  b'. First maxillæ with the apex of the third article furnished with three spines. Molar part of mandibles well developed. Second maxillæ indistinctly bilobed. Clypeus short and wide, in the form of an inverted v. Genus *Tridentella*, new genus

a'. First maxillæ with the apex of the third article furnished with a single, long, robust, inwardly-curved spine. Lacinia of first article in the form of a quadrate curve-faced cap furnished with papillæ and covering tip of first article. Second maxillæ four-jointed; first two joints stout; third joint stout and subconical; terminal joint slender and conical..............Genus *Nalicora* Moore

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[a] See Hansen for characters of family. Vidensk. Selsk. Skr. (6), V, 1890, pp. 312–313, 317, 390, and Stebbing, Fauna and Geography of the Maldive and Laccadive Archipelagoes, II, Pt. 3, 1904, p. 703.

27. Genus ALCIRONA Hansen.

Peduncle of the first pair of antennæ composed of two articles.

First maxillæ with the apex of the third article furnished with two spines. Second maxillæ simple, laciniæ not distinct.

Mandibles becoming narrower from the base to the apex; movable lacinia very small or wanting, molar part absent.

Clypeus very large, long, and very wide, semilunar in shape, with the post-lateral angle reaching beyond the middle of the mandibles and almost to the articulation of the mandibular palp.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ALCIRONA.

a. First pair of antennæ, with flagellum of seventeen articles, extend to the end of the fifth article of the peduncle of the second pair of antennæ. Second pair of antennæ, with flagellum of thirty-five articles, extend to the posterior margin of the seventh thoracic segment. The first article of the peduncle of the second antennæ is twice as long as the second; the third is as long as the first; the fourth is twice as long as the third; the fifth is twice as long as the fourth. Last three segments of thorax with rows of stiff hairs on the posterior margin, and all the segments of the abdomen and the uropoda are covered with short stiff hairs .... *Alcirona krebsii* Hansen

a′. First pair of antennæ, with flagellum of seven articles, extend to the end of the fourth article of the peduncle of the second pair of antennæ. Second pair of antennæ, with flagellum of seventeen articles, extend to the middle of the third thoracic segment. The first three articles of the peduncle of the first pair of antennæ are short, the fourth and fifth articles subequal and each about twice as long as the third article. Last five segments of thorax with rows of stiff hairs, and all the segments of the abdomen and the uropoda covered with short stiff hairs.................................. *Alcirona hirsuta* Moore

ALCIRONA KREBSII Hansen.

Alcirona krebsii Hansen, Vidensk. Selsk. Skr. (6), V, 1890, pp. 391–392, pl. viii, figs. 1–1q.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 519; Trans. Conn. Acad. Sci., XI, 1902, p. 290.

Localities.—Off Cape Catoche, Yucatan; St. Thomas, West Indies; Castle Harbor, Bermudas, in the cavities of living bathing sponges and in dead coral. Two specimens were taken from the fins of a Hamlet Grouper.

Depth.—25–28 fathoms.

Body oblong-ovate, a little more than twice as long as wide, 5 mm.: 11 mm. Head wider than long, 1 mm.: 2 mm., with the anterior margin rounded. Eyes small, round, composite, and situated in the antero-lateral angles of the head. The first pair of antennæ have the first article long; the second is fused with the first; the third is longer than the first. The flagellum is composed of eighteen articles. The first antennæ extend almost to the end of the fifth article of the peduncle of the second antennæ. The second pair of antennæ have the first article twice as long as the second; the third is as long as the first; the fourth is twice as long as the third; the fifth is twice as long as the fourth. The flagellum is composed of thirty-nine articles. The second pair of antennæ extend to the posterior margin of the seventh thoracic segment; the peduncle extends to the posterior margin of the first thoracic segment. The maxilliped is composed of seven articles. The palp of the mandibles is composed of three articles. The frontal lamina has the anterior portion broad, the posterior end attenuated; the anterior margin is triangulate.

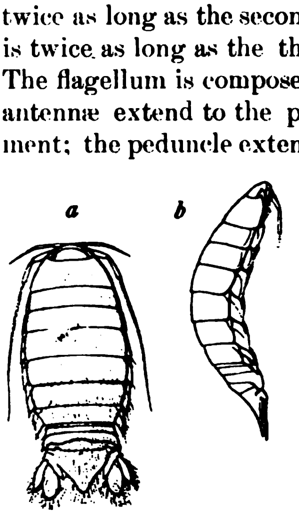

FIG. 137.—ALCIRONA KREBSII (AFTER HANSEN). *a*, DORSAL VIEW OF MALE. × $\frac{15}{4}$. *b*, LATERAL VIEW OF ADULT MALE. × $\frac{15}{4}$.

The first segment of the thorax is one and a half times longer than any of those following. The epimera are distinct on all the segments, with the exception of the first. The last four are crossed obliquely by an arched carina; the first two are crossed longitudinally. The outer post-lateral angles of the first two epimera are rounded; those of the last two are acutely produced beyond the posterior margins of the segments. The last three segments of the thorax are covered with short stiff hairs.

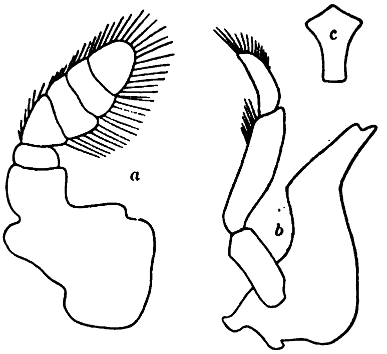

FIG. 138.—ALCIRONA KREBSII. *a*, MAXILLIPED. × $51\frac{1}{3}$. *b*, MANDIBLE. × $51\frac{1}{3}$. *c*, FRONTAL LAMINA. × $51\frac{1}{3}$.

The first two segments of the abdomen are entirely concealed by the seventh thoracic segment. The sixth or terminal segment is triangular in shape, with the apex narrowly rounded and furnished with six spines. The entire abdomen is densely covered with short stiff hairs or bristles. The inner branch of the uropoda is broad and widely rounded at the posterior extremity; it extends as far as the extremity of the abdomen. The outer branch is as long as the inner branch, is half as wide, and has the extremity narrow. The margins of both branches are furnished with spines, and stiff hairs or bristles densely cover the whole dorsal surface. The inner angle of the peduncle is produced and extends a little beyond the middle of the terminal abdominal segment.

The first three pairs of legs are prehensile, the last four pairs ambulatory.

ALCIRONA HIRSUTA Moore.

Alcirona hirsuta Moore, Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 170, pl. IX, figs. 6–10.

Locality.—Off St. Thomas.

Depth.—20–23 fathoms.

Found in coral bottom.

"Front slightly produced and somewhat inflexed between the bases of the antennules, not joining the epistome; eyes small, lateral, distance between two or three times their diameter. Body strongly arched antero-posteriorly. Epistome narrow, pentagonal. First antennæ with two-jointed peduncle reaching to about end of fourth joint of antennal peduncle. Flagellum slightly shorter than peduncle, of seven joints, first joint as long as second and third. Second antennæ reaching to middle of third segment, with five-jointed peduncle; first three joints short, fourth and fifth joints each about twice as long as third and subequal, flagellum with seventeen joints. Mandibular palp rather robust, three-jointed, second joint longest, second and third joints with setæ.

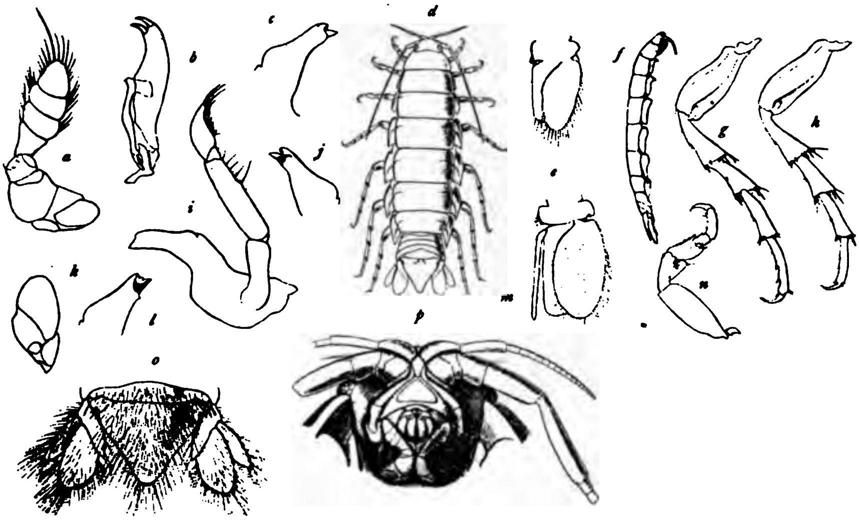

Fig. 139.—Alcirona krebsii (After Hansen). *a*, Maxilliped. *b*, First maxilla. *c*, Distal part of mandible. *d*, Dorsal view of female. *e*, Left pleopod of second pair in young male. *f*, Lateral view of female. *g*, Leg of fifth pair. *h*, Leg of seventh pair. *i*, Mandible. *j*, Distal part of mandible. *k*, Second maxilla. *l*, Distal part of mandible. *m*, Left pleopod of second pair in adult male. *n*, Leg of second pair. *o*, Posterior part of abdomen (adult male). *p*, Anterior part of head from below.

"Maxillipeds with five-jointed rather robust palps.

"First segment of trunk about 1.6 times as long as second, the next five equal, the seventh a little shorter; third segment with a few setæ on lateral portion of posterior margin; fourth, fifth, sixth, and seventh with complete rows becoming successively more dense posteriorly. In one specimen a very few hairs at side of second segment. First three pairs of peræopods subsimilar, fourth joint broad and armed with several very strong spines, fifth joint very short, almost hidden in the first leg, somewhat longer in the second and still longer in the third. Seventh joint pectinate, with four long spines in the first leg, in the second and third legs these becoming weaker. Claws strong in all.

"Last four legs successively longer and relatively to their length more slender than the first three pairs, heavily armed with numerous brown-tipped spines.

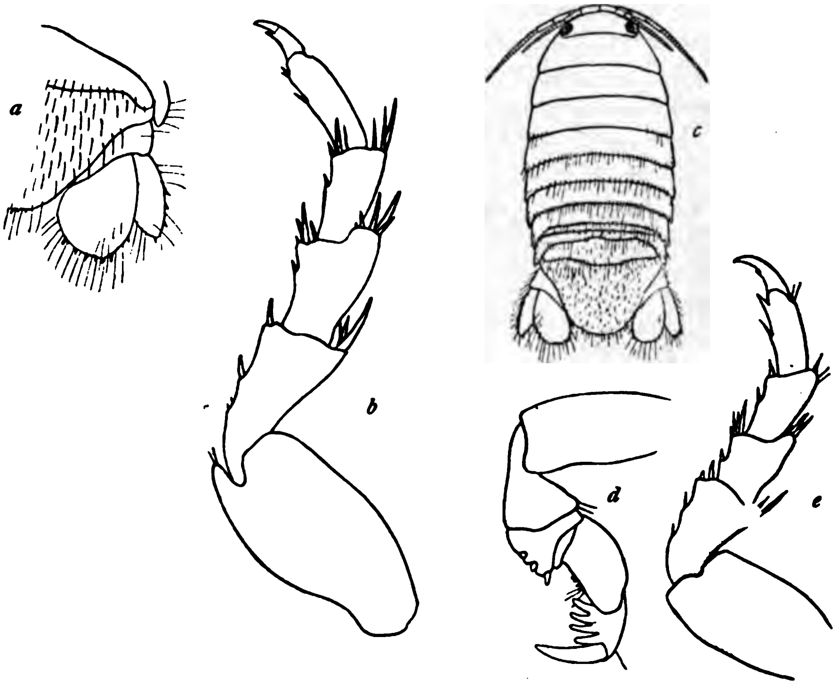

FIG. 140.—ALCIRONA HIRSUTA (AFTER MOORE). *a*, RIGHT SIDE OF TERMINAL ABDOMINAL SEGMENT WITH UROPOD. *b*, SEVENTH LEG. × 40. *c*, GENERAL FIGURE. × 8. *d*, FIRST LEG. × 40. *e*, FOURTH LEG. × 40.

"Pleon of five visible segments, dorsally strongly setose, first and second segments narrow and laterally covered by the seventh thoracic segment, the first being visible only dorsally; third segment posteriorly produced at the sides, covering the lateral portion of the fourth segment, which is the longest in the median line. This region is so setose that it is difficult to delimitate the segments.

"Telson triangular, with the tip rounded and armed with six spines, about two-thirds as long as broad; dorsal surface and posterior margin with numerous setæ. Uropods extending somewhat beyond end of telson, inner branch the longer, not much longer than broad, rounded, with about ten marginal spines and numerous setæ about half as long as the ramus itself; external ramus narrow, with about eight spines and numerous setæ on the posterior and outer margin.

"This species is close to *A. insularis*, from which it differs in its greater hairiness.

"Two specimens. Station 6079, 20 fathoms, 5 by 2.3 mm."—Moore.[a]

28. Genus TRIDENTELLA, new genus.

First pair of antennæ with peduncle composed of three articles.

First maxillæ with the apex of the third article furnished with three spines. Second maxillæ indistinctly bilobed at the tip.

Mandibles becoming narrower from the base to the apex; movable lacinia absent; molar part well developed.

Clypeus wide and short, in the form of an inverted v, with the post-lateral angles produced almost to the articulation of the mandibular palp.

Labrum small.

TRIDENTELLA VIRGINIANA (Richardson).

Cirolana virginiana Richardson, American Naturalist, XXXIV, 1900, p. 216; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 512–513.

Locality.—Chesapeake Bay.

Depth.—81 fathoms.

Body not quite twice as long as broad, oval, thickset. Head transverse, with indications of four small tubercles, two on the anterior portion, between the eyes, and two on the posterior portion. Eyes large, lateral. First pair of antennæ long, nearly as long as the second pair, reaching the posterior margin of the first thoracic segment; flagellum twelve-jointed. Second pair of antennæ extend to the middle of the third thoracic segment; flagellum eighteen-jointed.

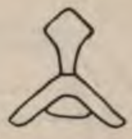

Fig. 141.—Tridentella virginiana. Frontal lamina, clypeus and labrum. (Diagrammatic.)

First thoracic segment one and a half times longer than any of the other segments. Following segments of equal length.

First abdominal segment almost entirely concealed by last thoracic segment. Four succeeding segments of equal length. Terminal segment very short and narrow, not longer than the four abdominal segments taken together, posteriorly rounded and crenulate. Both branches of the uropoda crenulate. Inner branch broad and equaling in length the terminal segment. Outer branch narrower and a little shorter than inner branch.

Abdomen minutely granulose.

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[a] Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 170.

Color, light brown.

Two specimens were collected by the U. S. Bureau of Fisheries steamer *Albatross* in Chesapeake Bay.

Type.—Cat. No. 6350, U.S.N.M.

The following description is of two specimens from southern California which I have not been able to separate from the species from the Atlantic coast:

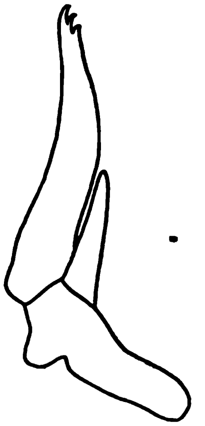

FIG. 142.—TRIDENTELLA VIRGINIANA. FIRST MAXILLA. × 51⅓.

Body oblong-ovate, nearly twice as long as wide, 5 mm.: 9 mm.

Head wider than long, 1¼ mm.: 2¼ mm., with the anterior margin rounded and produced in a small median point, which meets the anterior margin of the frontal lamina. There is a small tubercle situated at the base of the median point. The eyes are small, round, composite, and placed at the post-lateral angles. There are four tubercles on the dorsal surface of the head between the eyes, two close to the anterior margin and the other two close to the posterior margin, one on either side of the median line in each series.

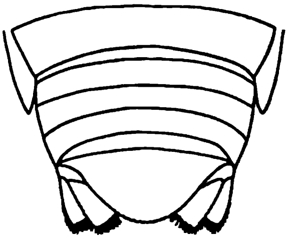

FIG. 143.—TRIDENTELLA VIRGINIANA. ABDOMEN.

The first pair of antennæ have the first two articles short and subequal; the third is about twice as long as the second. The flagellum is composed of twelve articles and extends to the posterior margin of the first thoracic segment. The second pair of antennæ have the first article a little longer than the second and equal in length to the third; the fourth is twice as long as the third; the fifth is a little longer than the fourth. The flagellum is composed of twenty articles and extends to the posterior margin of the third thoracic segment. The maxillipeds are composed of seven articles. The mandible has a palp of three articles. The frontal lamina is short and broad.

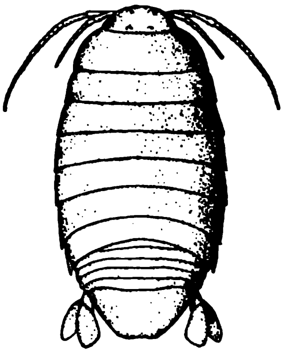

FIG. 144.—TRIDENTELLA VIRGINIANA. × 6.

The first segment of the thorax is twice as long as any of the following segments, which are subequal. The epimera are distinctly separated on all the segments with the exception of the first. The last four have the outer post-lateral angle acutely produced beyond the posterior margin of the segments.

All six segments of the abdomen are distinct, although the first is partly covered at the sides by the last thoracic segment. The sixth or terminal segment is wider than long, 3 mm.: 2 mm., and is rounded posteriorly with margins distinctly crenulate and has a slight median emargination. The inner branch of the uropoda reaches the extremity of the terminal segment of the abdomen. It is broad and truncate posteriorly, with margins distinctly crenulate and furnished with spines. The outer branch is shorter than the inner branch, is narrower and more pointed at its extremity. It is also distinctly crenulate and furnished with spines.

Two specimens of this species were collected by the U. S. Bureau of Fisheries steamer *Albatross* at station 4417, S. W. Rock, Santa Barbara Islands, latitude 8° north, longitude, 6.3′ west.

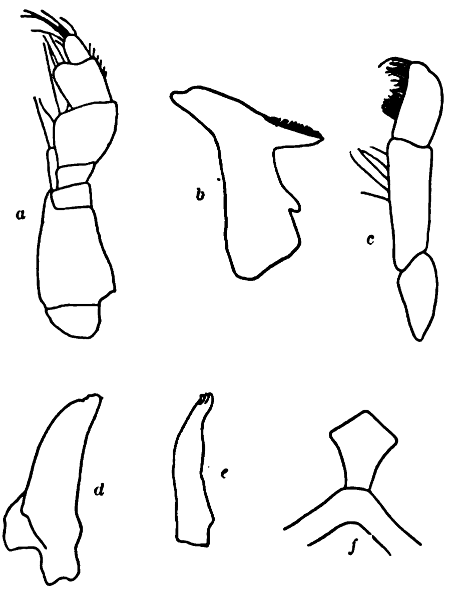

FIG. 145.—TRIDENTELLA VIRGINIANA. *a*, MAXILLIPED. × 51⅓. *b*, MANDIBLE. × 51⅓. *c*, PALP OF MANDIBLE. × 51⅓. *d*, SECOND MAXILLA. *e*, FIRST MAXILLA (OUTER LOBE). × 51⅓. *f*, FRONTAL LAMINA. × 27⅓.

Depth.—29 fathoms.

29. Genus NALICORA Moore.

"Clypeus small, peduncle of second antennæ long; mandible weak, with bidentate cutting edge and three-jointed palp; first maxillæ very large, robust, and conspicuous in situ, outer joint stout, hooked, and terminated by a strong, curved spine in the male, continuous in contour with the rest of the part, and with a knob-like process at its base; inner joint with its tip covered by a quadrate, curve-faced cap covered with papillæ; second maxillæ four-jointed, first two joints stout, short, third joint stout and subconical, terminal joint slender and conical, with a tuft of setæ near tip; palp of maxillipeds five-jointed, slender."—MOORE.[a]

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[a] Bull. U. S. Fish Commission, XX, Pt. 2, 1902, p. 169.

NALICORA RAPAX Moore.

Nalicora rapax MOORE, Bull. U. S. Fish Commission, XX, Pt. 2, 1902, pp. 169–170, pl. IX, figs. 11–22.

Localities.—Mayaguez Harbor, Porto Rico; Gulf of Mexico; latitude 29° 11′ 30″ north, longitude 85° 29′ west; latitude 28° 46′ north, longitude 84° 49′ west; latitude 29° 16′ 30″ north, longitude 85° 32′ west; between delta of the Mississippi and Cedar Keys, Florida.

Depth.—25–75 fathoms.

"Body convex, about 2.3 times as long as broad, first thoracic segment longest, next five about two-thirds as long and subequal, last shorter; posterior four thoracic segments with a row of setæ across middle and another on posterior margin, hairiness increasing posteriorly, occasionally a few setæ on second and third. Fifth segment broadest.

"Pleon and telson about two-fifths as long as rest of body. Pleon of four visible segments, first short and narrower than second and third and hidden at side by seventh thoracic; second somewhat produced at posterior lateral angle; third segment strongly produced, angle reaching to beyond base of uropods.

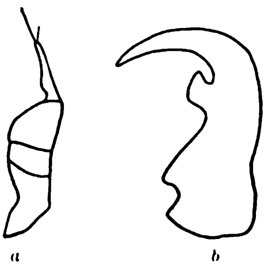

FIG. 146.—NALICORA RAPAX. *a*, SECOND MAXILLA. × 51⅓. *b*, OUTER LOBE OF FIRST MAXILLA. × 51⅓.

"Epimera of all the thoracic segments except the first distinct, of second and third not produced posteriorly, the following ones successively more produced, the last two terminating in strong angles.

"First antennæ about as long as peduncle of second antennæ; peduncle of two equal joints, flagellum slightly longer than peduncle, about eight or nine jointed; distal ends of segments furnished with a few short hairs; second antennæ reaching to end of second thoracic segment; peduncle five-jointed, fifth joint longest, slightly exceeding the fourth, which is as long as first three joints together.

"Mandible weak, with bifid cutting edge and three-jointed palp. First maxilla large, robust; plate of first joint expanded at distal end into a somewhat quadrate curved face closely beset with papillæ and looking like a triturating plate; third joint very stout, strongly curved with a very strong terminal spine continuous in contour with the rest of the joint; at base of curved portion, on inner side, a stout knoblike protuberance. The first maxilla is the largest and most conspicuous of the mouth parts, overlapping and hiding the mandible, and in the male reaching to the base of the antennæ. In the female the terminal spine is straighter, not so continuous with the rest of the plate, and points inward and somewhat backward. Second maxilla four-jointed; first two joints short and stout; second joint stout, decreasing distally; third joint slender and tapering, set at an angle to second joint and furnished at its tip with several setæ, one of which is usually longer and stouter than the others. Maxillipeds with rather slender five-jointed palp, more slender in male, first joint shortest, second joint longest, two to three times as long as first.

"First pair of thoracic limbs with fifth joint set obliquely to the plane of the preceding joints, very short, almost hidden on inner or anterior face, but triangular and appearing to be deeply embedded in fourth joint when viewed externally; fourth joint with about four stout spines on inferior edge, second limb with fifth joint longer and with slight obliquity; third pair similar but longer. Pairs four to seven more slender, with numerous spines, the third, fourth, fifth, and sixth joints subequal.

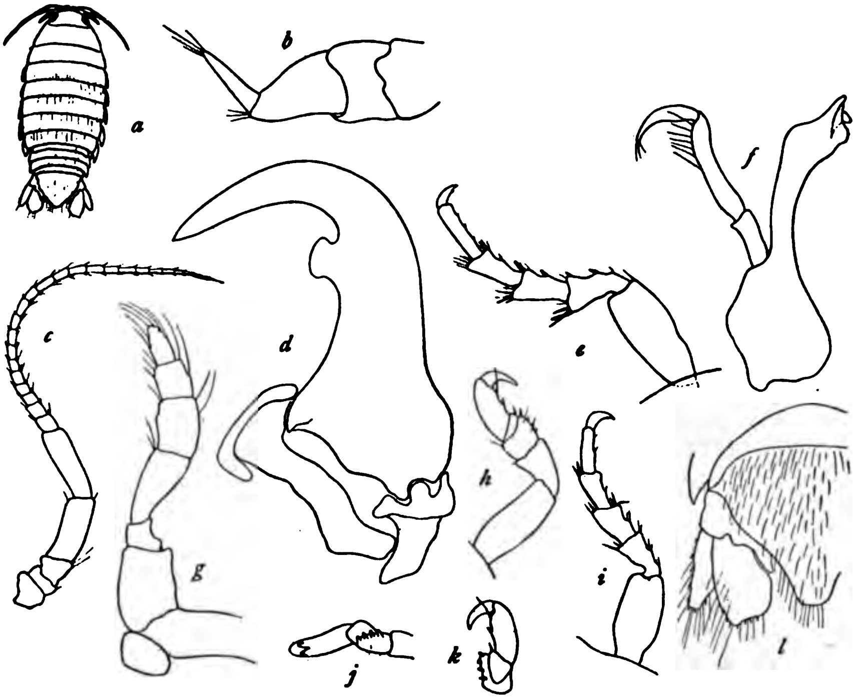

Fig. 147.—Nalicora rapax (After Moore). *a*, General figure. *b*, Second maxilla. *c*, Second antenna. *d*, First maxilla. *e*, Seventh leg. *f*, Mandible. *g*, Maxilliped. *h*, First leg (posterior). *i*, Fourth leg. *j*, First leg (anterior). *k*, First leg (inferior). *l*, Part of terminal segment of abdomen with uropoda.

"Uropods stout, the peduncle prolonged at its inner angle into a robust process. Inner ramus broad (about 1.5 times as long as broad), extending beyond end of telson; outer ramus shorter and narrower, extending barely beyond tip of telson; apex truncate or subbifid.

"Telson triangular, about two-thirds as long as broad, lateral margins somewhat excavated, apex narrow, rounded.

"Seventeen specimens from stations 6062 and 6063, 25 to 75 fathoms. Largest 8.5 mm. by 3.8 mm.; smallest 5.5 mm. by 2.5 mm."—MOORE.[a]

Family VIII. ÆGIDÆ.

Body more or less broad, flattened.

Head transverse.

Segments of thorax with epimera distinctly defined on all the segments, with the exception of the first.

Abdomen composed of six well-defined segments, the last segment ciliated on the posterior margin. Uropoda together with the terminal abdominal segment forming a caudal fan. Eyes, when present, usually large. Antennæ laterally directed, both pairs furnished with distinctly defined, multi-articulate flagella. Peduncle and flagella well defined.

First three pairs of legs prehensile, last four pairs ambulatory.

Pleopods serving for swimming and for respiration; furnished with cilia.

First maxillæ with only a single slender masticatory lobe, tipped by short spines.

Second maxillæ broader, terminating in two unequal lobes, armed with recurved teeth.

Last article of palp of maxillipeds armed with strong recurved teeth.

Terminal abdominal segment and uropoda furnished with cilia.

Parasitic forms usually found attached to the skin of fishes.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY ÆGIDÆ.

a. Body compact. First two articles of the peduncle of the first pair of antennæ more or less expanded. Frontal lamina large. Maxillipeds with the palp composed of five articles. Front of head with median point separating wholly or partly the first articles of the first pair of antennæ. Flagellum of the first antennæ composed of numerous articles. Abdomen compact......Genus *Æga* Leach

a'. Body depressed. First two articles of the peduncle of the first pair of antennæ not expanded. Frontal lamina small. Maxillipeds with the palp composed of only two articles. Front of head covering more or less the peduncle of the first pair of antennæ. Flagellum of first antennæ composed of four to six articles. Abdomen relaxed.

  b. Eyes present. Three anterior pairs of legs with propodus more or less expanded, and armed with spines; dactylus forming a very large and evenly curved hook. Four posterior pairs with the propodus short. Mandibles with the cutting edge expanded inside in a linguiform lamella. Abdomen not much narrower than thorax..................................Genus *Rocinela* Leach

  b'. Eyes wanting. Three anterior pairs of legs with propodus not expanded; dactylus abruptly curved in the middle and terminating in a very sharp point. Four posterior pairs with the propodus elongated. Mandibles without linguiform lamella. Abdomen abruptly narrower than thorax..Genus *Syscenus* Harger

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[a] Bull. U. S. Fish Commission, XX, Pt. 2, 1902, pp. 169-170.

30. Genus ÆGA Leach.

Body rather compact. Abdomen not much narrower than thorax.

Eyes present, usually large, often contiguous.

First two articles of the peduncle of the first pair of antennæ more or less expanded, dilated. Frontal lamina or epistome large.

Mandibles without molar expansion. Palp of maxillipeds composed of five articles.[a]

Three anterior pairs of legs with the propodus simple, cylindrical, not expanded; dactylus abruptly curved in the middle. Four posterior pairs with the propodus short.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ÆGA.

- *a*. First pair of antennæ with the first two articles of the peduncle very much enlarged, dilated, flattened. The second article is produced at the upper distal angle in a process which extends half the length of the third article. The third article is half as wide as the second article, or narrower. Frontal lamina plane or concave.
  - *b*. Terminal segment of abdomen pointed posteriorly, triangulate.
    - *c*. Eyes distant..*Æga psora* (Linnæus)
    - *c′*. Eyes contiguous......................*Æga antillensis* Schiœdte and Meinert
  - *b′*. Terminal segment of abdomen not pointed posteriorly or triangulate.
    - *c*. Terminal segment bisinuate, forming three obtuse teeth on the posterior margin..*Æga ecarinata* Richardson
    - *c′*. Terminal segment of abdomen posteriorly emarginate or truncate.
      - *d*. Eyes contiguous.....................................*Æga crenulata* Lütken
      - *d′*. Eyes distant.
        - *e*. Propodus of second and third pairs of legs furnished at distal end on inferior margin with linguiform process................*Æga webbii* (Guérin)
        - *e′*. Propodus of second and third pairs of legs not furnished at distal end on inferior margin with linguiform process............*Æga lecontii* (Dana)
- *a′*. Peduncle of the first pair of antennæ with the first two articles not enlarged or dilated, but compressed and rounded. The second article is not produced at the upper distal angle in a process which extends half the length of the third article. Third article not narrower than second article. Frontal lamina convex or compressed and elevated.
  - *b*. Eyes contiguous.
    - *c*. Terminal segment of abdomen whole, entire. *Æga tenuipes* Schiœdte and Meinert
    - *c′*. Terminal segment of abdomen not whole or entire.
      - *d*. Terminal segment of abdomen terminating in seven teeth in the middle. *Æga dentata* Schiœdte and Meinert
      - *d′*. Terminal segment of abdomen with small rounded incision or emargination at the apex ....*Æga incisa* Schiœdte and Meinert
  - *b′*. Eyes not contiguous.
    - *c*. Terminal segment of abdomen with small, round median notch or emargination ....*Æga arctica* Lütken
    - *c′*. Terminal segment of abdomen without median notch or emargination.
      - *d*. Eyes very large.

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[a] In drawing the maxillipeds of the various species it was not always possible to place the maxilliped in a position to show all five articles of the palp or to represent the dividing line between the last two articles.

e. All legs free of spines............................ *Æga gracilipes* Hansen

e′. Legs furnished with spines.

f. Uropoda extend beyond the tip of the abdomen. *Æga symmetrica* Richardson

f′. Uropoda do not extend beyond the tip of the abdomen. *Æga ventrosa* M. Sars

d′. Eyes very small................................ *Æga microphthalma* Dana

ÆGA PSORA (Linnæus).

Oniscus psora Linnæus, Fauna suecica, 2d ed., 1761, p. 499, No. 2054; Syst. Nat., 12th ed., I, 1767, p. 1060.—O. Fabricius, Fauna Grœnlandica, 1780, p. 249.

Æga emarginata Leach, Trans. Linn. Soc. London, XI, 1815, p. 370; Dict. Sci. Nat., XII, 1818, p. 349.—Desmarest, Consid. Crust., 1825, p. 305, pl. xlvii, figs. 4–5.

Æga entaillée Latreille, Règne Anim., IV, 1829, p. 134.

Æga emarginata Gould, Rept. Geol. Mass., 1835, p. 549.

Æga (*Oniscus psora*) Krøyer, Dansk. Vid. Selsk. Afh., VII, 1838, p. 318.

Æga emarginata Milne Edwards, Hist. Nat. Crust., III, 1840, p. 240.—Gould, Invert. Mass., 1841, p. 338.—Milne Edwards, Règne Anim. Crust., 1849, pl. iv, fig. 4; pl. lxvii, fig. 1.

Æga psora Lilljeborg, Öfvers. Vet.-Acad. Förh., VII, 1850, p. 84; VIII, 1851, p. 24.—Lütken, Vidensk. Meddel., 1859, pp. 65, 179; 1861, p. 181 (7).—Schiœdte, Ann. Mag. Nat. Hist. (4), I, 1868, p. 12.—Bate and Westwood, British Sessile-eyed Crustacea, II, 1868, p. 283.—M. Sars, Chr. Vid.-Selsk. Förh., 1869, p. 261.—G. O. Sars, Chr. Vid.-Selsk. Förh., 1872, p. 275 (32).—Verrill, Am. Jour. Sci. (3), V, 1873, p. 16.—Smith and Harger, Trans. Conn. Acad. Sci., III, 1874, p. 22.—Lütken, Crustacea of Greenland, 1875, p. 150.—Meinert, Naturh. Tidsskr. (3), XI, 1877, p. 89.—Miers, Ann. Mag. Nat. Hist. (4), XIX, 1877, p. 134.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 161; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 384–387, pl. x, fig. 64 (see Harger for synomymy).—Schiœdte and Meinert, Nat. Tidsskr. (3), XII, 1879–80, pp. 357–360, pl. viii, figs. 5–6.—Miers, Journ. Linn. Soc. London, Zool., XV, 1881, pp. 65–66.—Hansen, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–1888, p. 183.—Sars, Crust. of Norway, II, 1899, p. 59, pl. xxiv.—Richardson, American Naturalist, XXXIV, 1900, p. 218; Proc. U. S. Nat. Mus., XXIII, 1901, p. 521.—Axel Ohlin, Bihang till K. Svenska Vet.-Akad. Handl., XXVI, Afd. iv, 1901, pp. 22–23.

Localities.—Off Marthas Vineyard; Georges Bank; Browns Bank; Fishers Island Sound; La Have Bank; Gulf of Maine; Western Bank; Gloucester; Sable Island Bank; between Peters Bank and Banquereau; Nova Scotia; Grand Bank; Newfoundland; Gulf of St. Lawrence; Nakvak, Labrador; Holstensborg, Nanortalik, Ivigtut, Julianehaab, Arsųkfjord, Godhavn, Egedesminde, Ikerasak, and Umanek, Greenland; North Greenland in Davis Straits; Hudsons Bay; also Ireland; British Isles; North Sea; Finmark; Iceland; Bjonens Bay; Spitzbergen; in the German Sea; Kattegat; between the delta of the Mississippi and Cedar Keys, Florida; latitude 43° 34′ north, longitude 49° west; latitude 43° 25′ north, longitude 59° 50′ west; latitude 42° 47′ north; longitude 65° 30′ west.

Depth.—30–640 fathoms.

Parasites of skate, cod, and halibut; on *Gadus ogac;* on *Myxocephalus scorpius;* on *Somniosus microcephalus;* on *Gadus callarias.*

Body ovate, a little more than one and a half times longer than broad, 10 mm : 16 mm.

Head two and a half times broader than long, 2 mm : 5 mm. Anterior margin widely rounded, and produced in a small median point, which does not arch over the antennæ to meet the frontal lamina on the other side. Eyes large, oval, composite, occupying a large part of the dorsal surface of the head, but not contiguous, although very close together. The first pair of antennæ have the first two articles very much enlarged; the first article is wider and longer than the second; the second is produced at the upper distal angle in a process which extends half the length of the third article; the third article is very narrow, half as wide as the second article. The flagellum is composed of fourteen articles. The first antennæ extend to the end of the peduncle of the second pair of antennæ. The first three articles of the second antennæ are subequal; the fourth and fifth are about equal in length, and each twice as long as the third. The flagellum is composed of fifteen articles. The second pair of antennæ extend a little beyond the posterior margin of the first thoracic segment. The frontal lamina is large, with base somewhat quadrate in shape, with rounded angles, and ventrally placed, not directed anteriorly. The maxilliped has a palp of five articles.

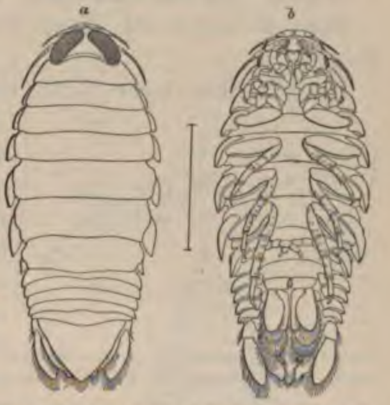

FIG. 148.—ÆGA PSORA (AFTER HARGER). × 3.
a, Ventral view. *b*, Dorsal view.

The first three segments of the thorax are longer than the three following. The seventh is very short, being only less than half as wide as the sixth. The epimera of all the segments are distinct with the exception of the first. They are narrow plates with the posterior angles produced in the last four, although in the epimeron of the fourth segment, the posterior angle is rounded. On all the epimera there is a faint carina extending obliquely across the surface.

All six segments of the abdomen are distinct. The first is completely covered in the middle by the seventh thoracic segment but is visible at the sides. The lateral parts of the segments are not separated off from the dorsal portion. The sixth or terminal segment is triangulate, with apex not produced. The branches of the uropoda do not extend beyond the tip of the terminal abdominal segment. The basal segment extends two-thirds the length of the sixth abdominal segment. The branches are about equal in length, the outer one being only a very little shorter than the inner one. The exterior margin of the inner branch has a small notch or excavation about 1 mm. from the extremity. The inner branch is obliquely truncate at the extremity, the inner angle being obtusely rounded, the outer one more acute. The outer branch is rounded posteriorly.

The first three pairs of legs are prehensile, the last four pairs ambulatory. The second and third pairs have the carpus furnished with eight spines, the merus with two. The last four pairs of legs are also furnished with spines.[a]

ÆGA ANTILLENSIS Schiœdte and Meinert.

Æga antillensis SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XII, 1879–80, pp. 361–362, pl. VIII, figs. 10–13.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 521.

Localities.—Cuba, West Indies, off Cozumel; off Habana.

Depth.—163–231 fathoms.

Body oblong-ovate, about three times as long as broad, 12 mm.: 35 mm.

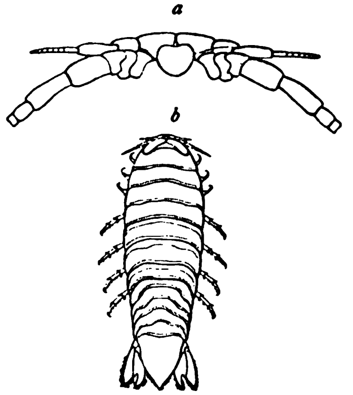

FIG. 149.—ÆGA ANTILLENSIS (AFTER SCHIŒDTE AND MEINERT). *a*, FRONTAL MARGIN WITH BOTH ANTENNÆ AND FRONTAL LAMINA. *b*, YOUNG FEMALE. (ENLARGED.)

Head a little over three times as wide as long, 2 mm.: 7 mm. Anterior margin widely rounded with a small median process which does not arch over the antennæ to meet the frontal lamina on the other side. Eyes large, oblong, composite, occupying almost the entire surface of the head and extending from the lateral angles along the anterior margin and meeting or contiguous in the median line. The basal article of the first antennæ is about twice as long as the second; the first and third are subequal, but the third is narrower, the first and second being dilated. The flagellum is composed of seven articles. The first antennæ extend only to the middle of the fifth article of the peduncle of the second antennæ and do not reach the anterior margin of the first thoracic segment. The first two articles of the second pair of antennæ are equal in length; the third is about twice as long as the second; the fourth is one and a half times longer than the third; the fifth is but little longer than the fourth. The flagellum is composed of thirteen articles and reaches two-thirds the length of the first thoracic segment. The maxilliped has a palp of five articles. The frontal lamina has the large round disk of the base ventrally placed, not anteriorly directed.

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[a] For description of the young of the third stage, see Schiœdte and Meinert, Nat. Tidsskr. (3), XII, 1879–80, pp. 358–359.

The first segment of the thorax is a little longer than any of the others, and the seventh is shorter. The epimera of all the segments, from the second to the seventh, inclusive, are distinctly separated from the segment. They are narrow, with the posterior angle in the last four acutely produced beyond the posterior margin of the segments. The first two epimera are rounded posteriorly. A distinct carina extends obliquely from the posterior angle to the inner antero-lateral angle in all the epimera.

The six abdominal segments are all distinct. The lateral parts are not separated off from the dorsal portion. The sixth or terminal segment is triangularly produced in a long and very acute point, extending 2 mm. beyond the extremity of the uropoda. The branches of the uropoda are equal in length. The inner branch has a conspicuous notch or emargination on the exterior margin about 2 mm. from the posterior extremity which is acutely produced. The outer branch is about as wide as the inner branch, the margins are entire, and the posterior extremity rounded. The branches of the uropoda are crenulate and furnished with spines. The basal article or peduncle extends half the length of the last segment of the abdomen.

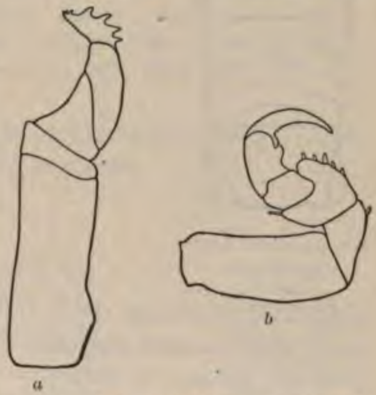

FIG. 150.—ÆGA ANTILLENSIS. *a*, MAXILLIPED. × 27½. *b*, LEG OF SECOND PAIR. × 9½.

The first three pairs of legs are prehensile, the last four pairs ambulatory. There are five spines on the merus of the second and third pairs of legs. The last four pairs of legs are thickly beset with spines.

ÆGA ECARINATA Richardson.

Æga ecarinata RICHARDSON, Proc. Biol. Soc. Washington, XII, 1898, pp. 39–40; American Naturalist, XXXIV, 1900, p. 218; Proc. U. S. Nat. Mus., XXIII, 1901, p. 521.—MOORE, Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 171, pl. x, fig. 1.

Localities.—Off Little Bahama Bank, between delta of the Mississippi and Cedar Keys, Florida; off entrance to San Juan.

Depth.—88–338 fathoms.

Body elongate and narrow. Length more than three times greater than breadth. Surface punctate. Frontal margin of head bisinuated, the acumen separating the first pair of antennæ. Eyes large and oblong and situated a small distance apart. First pair of antennæ extend almost to the flagellum of the second pair of antennæ; the first two joints of the peduncle very broad; second joint extends anteriorly over the third joint, reaching almost to the extremity of that joint; third joint two-thirds narrower than first and second; the flagellum is composed of nine articles. Second pair of antennæ extend to the middle of the first thoracic segment; flagellum is composed of ten articles.

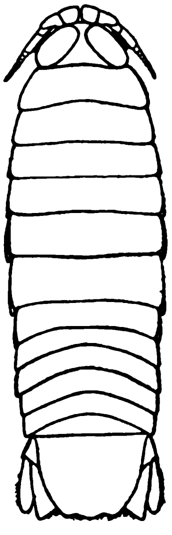

FIG. 151.—ÆGA ECARINATA. × 2⅓.

Epimera of all the thoracic segments narrow, the first two being rounded, the other four more acute at their extremities. First two pairs of prehensile legs rather stout; third pair less so, and the propodus of this pair is furnished with a large cultriform process. Five spines are present on the merus of all three pairs. Gressorial legs slender and sparsely spinulose.

All the abdominal segments are visible in a dorsal view. Terminal segment broad and posteriorly bisinuated, forming three teeth with rounded extremities; its surface is entirely smooth.

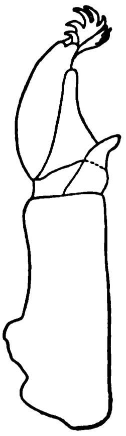

FIG. 152.—ÆGA ECARINATA. MAXILLIPED. × 39.

Outer branch of uropods narrower and somewhat shorter than the inner branch; its extremity is rounded. Inner branch obliquely truncate and crenulate on posterior margin. Uropods and terminal abdominal segment all fringed with a few hairs.

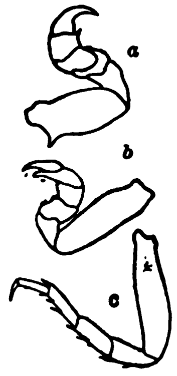

FIG. 153.—ÆGA ECARINATA. × 5⅓. *a*, LEG OF FIRST PAIR. *b*, LEG OF THIRD PAIR. *c*, LEG OF SEVENTH PAIR.

Two individuals of this species were found—one between the delta of the Mississippi and Cedar Keys, Florida, Station 2403, depth 88 fathoms; the other, the type (Cat. No. 21001, U.S.N.M.), off Little Bahama Bank, Station 2655, depth 338 fathoms.

This species is closely related to *A. tridens*[a] Leach, but presents many specific differences; in the relative length and breadth of the body, the length being more than three times greater

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[a] For synonymy, see Naturhistorisk Tidsskrift, XII, 1879–80, Schiœdte and Meinert, Symbolæ ad Monographium Cymothoarum, Crustaceorum Isopodum Familiæ, pp. 340–341.

than the breadth in *A. ecarinata*, while in *A. tridens* Leach the length is only two and one-half times greater than the breadth; in the number of joints in the first and second pairs of antennæ, ten in the first pair and nineteen in the second pair being characteristic of *A. tridens* Leach, nine in the first and ten in the second pair being true of our species; in the presence of a cultriform process on the propodus of the third pair of prehensile legs, which process is entirely wanting in *A. tridens* Leach; and in the perfectly smooth surface in the present species of the terminal segment of the abdomen, which in the other species is tricarinated.

ÆGA CRENULATA Lütken.

Æga crenulata Lütken, Vid. Medd. Naturh. Foren. i Kjøbenhavn, 1859, p. 70, pl. A, figs. 4-5.—Schiœdte and Meinert, Naturh. Tidsskrift (3), XII, 1879-80, p. 343, pl. vii, figs. 6-9.—Miers, Journ. Linn. Soc. London, XV, 1881, p. 65.—Hansen, Vid. Medd. Naturh. Foren. i Kjøbenhavn, 1887, p. 183.—Richardson, American Naturalist, XXXIV, 1900, p. 218; Proc. U. S. Nat. Mus., XXIII, 1901, p. 521.—Norman, Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 434.

Localities.—Ritenbenk and Umanek, West Greenland; also Iceland, Finmark, and coast of Norway; in the German Sea.

Parasite of Greenland shark; *Somniosus microcephalus*.

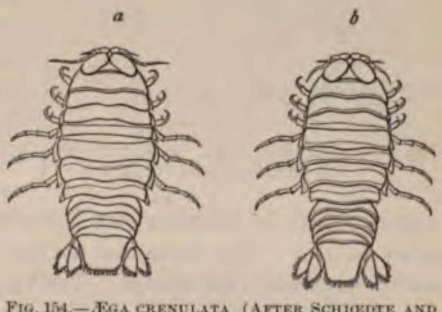

Fig. 154.—Æga crenulata (After Schiœdte and Meinert). *a*, Young of third stage. *b*, Young of second stage. (Both enlarged.)

Body oblong-ovate, a little more than twice as long as broad, 13 mm.: 28 mm.

Head a little more than twice as wide as long, 3 mm.: 7 mm. Anterior margin widely rounded and produced in a small median point, which does not arch over the antennæ to meet the frontal lamina on the other side. Eyes large, oval, composite, and occupying almost all the dorsal surface of the head, extending from the lateral angles, along the anterior margin and meeting in the median line, being contiguous. The first antennæ have the two basal articles of the peduncle very much enlarged; the first article is longer and a little wider than the second; the second has a process at the anterior angle of the distal extremity, extending half the length of the third article; the third article is short and narrow, being one-third as wide as the basal article. The flagellum is composed of nine articles. The first antennæ extend to the end of the peduncle of the second pair of antennæ, but not quite to the antero-lateral angles of the first thoracic segment. The first three articles of the second antennæ are subequal; the fourth article is about twice as long as the third; the fifth is a little longer than the fourth. The flagellum is composed of sixteen articles. The second antennæ extend almost to the posterior margin of the first thoracic segment. The frontal lamina is round in outline at the base, which is ventrally situated, not directed anteriorly. The maxilliped has a palp of five articles.

The first, fourth, fifth, and sixth segments of the thorax are longer than the others. The epimera are distinct on all the segments with the exception of the first. They are narrow plates with the post-lateral angles acute. A distinct carina extends obliquely from the post-lateral angle to the middle of the side adjacent to the segment in the last three epimera and to the inner antero-lateral angle in the first three epimera.

All six segments of the abdomen are distinct. The lateral parts are not separated from the dorsal portion. The sixth or terminal segment has the sides converging to an extremity, which is truncate or but slightly excavate and about half as wide as the base, 3 mm.: 7 mm. The posterior margin is crenulate. The branches of the uropoda are about equal in width; the outer one is rounded posteriorly; the inner one is obliquely truncate, the inner angle rounded, the outer one being more acute. The branches of the uropoda are somewhat crenulate and furnished with spines. The basal article extends two-thirds the length of the last abdominal segment.

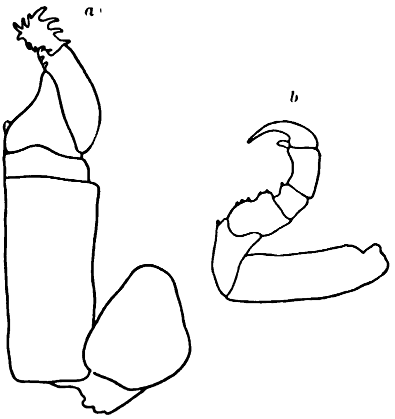

FIG. 155.—ÆGA CRENULATA. *a*, MAXILLIPED. × 27½. *b*, SECOND LEG. × 9½.

The first three pairs of legs are prehensile, the last four pairs ambulatory. The propodus of the second and third pairs is furnished with a linguiform process at the distal end; the carpus has one very small and inconspicuous spine; the merus also has five small inconspicuous spines.[a]

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[a] For description of the young of the second and third stages see Schiødte and Meinert, Nat. Tidsskr. (3), XII, 1879–80, pp. 344–346.

ÆGA WEBBII (Guérin).

Pterelas webbii GUÉRIN, Mag. Zool., Cl. VII, 1836, pl. xx, figs. 1a–e.—MILNE EDWARDS, Hist. Nat. Crust., III, 1840, p. 245.

Æga webbii SCHIŒDTE and MEINERT, Naturh. Tidssk. (3), XII, 1879–80, pp. 347–348, pl. x, figs. 1–4.

?*Æga webbii* HARGER, Bull. Mus. Comp. Zool., Harvard College, 1883, XI, No. 4, p. 95.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 218; Proc. U. S. Nat. Mus., XXIII, 1901, p. 522.

Localities.—Off Fernandina, Florida; latitude 31° 57′ north, longitude 78° 18′ 35″ west (Harger); also Cape of Good Hope; Portugal.

Depth.—333 fathoms.

Body oblong-ovate, twice as long as wide, 8 mm. : 16 mm.

Head twice as wide as long, 2 mm. : 4 mm. Anterior margin widely rounded and produced in a small median point, which does not arch over the antennæ to meet the frontal lamina on the other side. Eyes large, oval, composite, not contiguous, and separated in front by a distance equal to the width of one eye. The first pair of antennæ have the two basal articles large and dilated, the first one being a little longer and wider than the second one; the second article has the outer distal end produced in a process which extends about half the length of the third article; the third article is about as long and half as wide as the basal article. The flagellum is composed of eight articles. The first antennæ reach the end of the peduncle of the second antennæ, but do not extend to the posterior margin of the head. The second pair of antennæ have the first three articles about equal in length; the fourth article is a little more than twice as long as the third; the fifth is just a little longer than the fourth. The flagellum is composed of

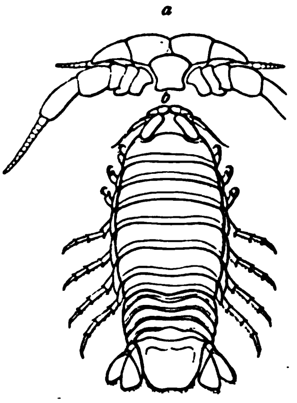

FIG. 156.—ÆGA WEBBII (AFTER SCHIŒDTE AND MEINERT). *a*, FRONTAL MARGIN WITH BOTH PAIRS OF ANTENNÆ AND FRONTAL LAMINA. *b*, ADULT MALE. (ENLARGED.)

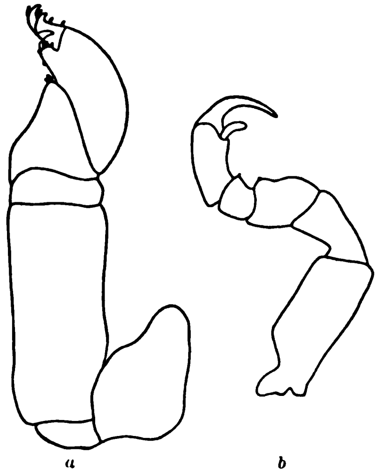

FIG. 157.—ÆGA WEBBII. *a*, MAXILLIPED. ×51⅓. *b*, LEG OF THE SECOND PAIR. × 15⅓.

fifteen articles. The second antennæ extend to the posterior margin of the first thoracic segment. The frontal lamina is large, conspicuous, with the basal part ventrally placed, not anteriorly directed, and somewhat quadrate in outline, with the anterior margin a little produced in the middle between the basal articles of the antennæ. The maxilliped has a palp of five articles.

The first, fifth, and sixth segments of the thorax are a little longer than any of the others. The epimera are distinct from the segments, are narrow plates, with a distinct carina extending obliquely across the surface.

All six segments of the abdomen are distinct. The lateral parts are not separated off from the dorsal portion of the segment. There is a distinct carina extending from the posterior angle a short distance across the lateral parts of the first five segments. The sixth or terminal segment is broad, with its posterior extremity truncate, and about half as wide as the basal part of the segment. The posterior margin is denticulate. The uropoda are as long as the terminal segment. The branches are equal in length. The inner one is about one and a half times wider than the outer one, is posteriorly truncate, while the outer one is rounded posteriorly; their posterior margins are faintly crenulate.

The first three pairs of legs are prehensile, the last four pairs ambulatory. There is a linguiform process at the distal end of the propodus of the second and third pairs of legs. On the carpus of these legs is one small blunt spine, on the merus are five small blunt spines, and at the distal end of the ischium are two small ones.

ÆGA LECONTII (Dana).

Ægacylla lecontii Dana, Proc. Acad. Nat. Sci. Phila., VII, 1854, p. 177.—Stimpson, Bost. Jour. Nat. Hist., VI, 1857, p. 509.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, pp. 826–827; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 167–168; American Naturalist, XXXIV, 1900, p. 218.

Localities.—California (Dana); Monterey Bay, California.

Body elongate, oval; surface smooth; color yellow, with a few brown dots; eyes reddish brown.

Head with anterior margin bisinuated, the median point separating the basal joints of the first pair of antennæ and extending one-third the length of these joints. Eyes large, oval, very close together at upper inner angle. First pair of antennæ with basal joints very large, dilated; second joint of peduncle dilated, and with a process at the apex extending nearly the length of the third joint; third joint very narrow, about one-third the width of two preceding joints; flagellum, composed of seven joints, extends the length of the peduncle of second pair of antennæ. Second pair of antennæ, with a flagellum of twelve joints, extend almost to the posterior margin of the first thoracic segment.

The last four thoracic segments are each a little longer than any of the first three. The epimera are narrow. with rounded post-lateral angles.

The five abdominal segments are of equal length. The terminal segment is subtriangular with truncate extremity; its posterior margin is crenulate and fringed with hairs. The uropoda exceed slightly the length of the abdomen. The inner branch is about twice as wide as the outer branch; is obliquely truncate, and crenulate. The outer branch is narrow, rounded posteriorly, and smooth. Both branches are fringed with hairs.

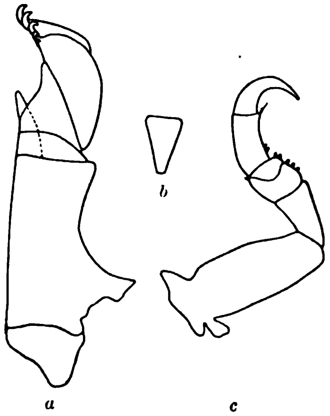

FIG. 159.—ÆGA LECONTII. *a*, MAXILLIPED. × 38⅓. *b*, FRONTAL LAMINA (DIAGRAMMATIC). *c*, SECOND LEG. × 11⅓.

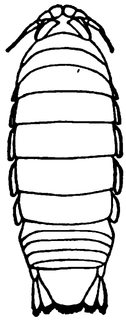

FIG. 158.—ÆGA LECONTII. × 2.

The legs are long and slender. Five spines are present on the merus of the prehensile legs. The gressorial legs are but slightly spinulose.

Two specimens examined were collected at Monterey Bay, California, by Mr. Heath.

The description of this species of *Æga* by Dana as *Ægacylla lecontii* was from a young specimen. The individual sent us is thought to be the adult form, and differs from Dana's description of the young individual in the crenulated posterior margin of the terminal segment, in the truncated inner branch of the uropoda, and in the addition of two joints to the length of the flagellum of the second pair of antennæ.

ÆGA TENUIPES Schiœdte and Meinert.

Æga tenuipes SCHIŒDTE and MEINERT, Naturh. Tidsskrift (3), XII, 1879–80, p. 371, pl. IX, figs. 4–6.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 522.

Locality.—Cuba.

Body ovate, surface rather smooth but punctate.

Front of head bisinuate, with the frontal point bent downward and contiguous with the frontal lamina.

Frontal lamina rhomboid in shape.

Eyes large, oblong, contiguous along the four series of ocelli.

The first pair of antennæ reach the posterior angle of the first segment of the thorax, extending with the peduncle to the fourth article, with the flagellum to the tenth article of the second pair of antennæ.

The flagellum is composed of eleven articles, with the first article slender, equaling in length the following article.

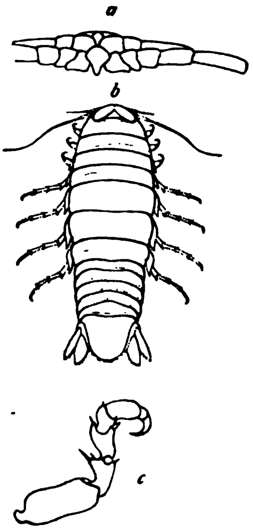

FIG. 160.—ÆGA TENUIPES (AFTER SCHIŒDTE AND MEINERT). *a*, FRONTAL MARGIN WITH ANTENNÆ AND FRONTAL LAMINA. *b*, YOUNG FEMALE. *c*, RIGHT LEG OF SECOND PAIR. (ALL ENLARGED.)

The second pair of antennæ extend to the fourth epimeron; the flagellum is composed of twenty-four articles.

The first segment of the thorax is slightly bisinuate on its dorsal surface. The epimera are rather narrow; the posterior angles of the posterior epimera are acutely produced; the last epimeron extends to the middle of the first segment of the abdomen.

The prehensile legs are slender, smooth; the basis is rather narrow; the anterior ungulæ are rather short, somewhat incurved; the posterior ones are somewhat larger.

The ambulatory legs are produced, slender, and furnished with scattered spines.

The first segment of the abdomen is largely concealed. The last segment is lingulate, posteriorly obscurely crenulate, smooth above. The uropoda are rather long; the inner branch is much longer and wider than the outer branch; both branches are posteriorly attenuated and obscurely crenulated.

Length 11.5 mm.[a]

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[a] The above description is adapted from the following one of Schiœdte and Meinert's:

Producte obovata, supra præter punctaram ordinariam læviuscula.

Frons bisinuata, acumine procumbente laminæ frontali contiguo.

Lamina frontalis rhomboidalis. Oculi magni, oblongi, seriebus ocellorum quaternis contigui. Antennæ primi paris angulum posticum annuli primi trunci attingentes, scapo articulum quartum, flagello articulum decimum antennarum secundi paris explentes; flagellum 11-articulatum, articulo primo tenui, articulum sequentem longitudine æquante.

Antennæ secundi paris epimerum quartum explentes; flagellum 24-articulatum.

Segmentum dorsale annuli primi trunci ante leviter bisinuatum.

Epimera angustiuscula; anguli postici epimerorum posteriorum acuti, producti; epimerum ultimum dimidiam partem articuli primi caudalis explens.

Pedes prensorii graciles, glabriusculi; femora angustiuscula; ungulæ primæ breviusculæ, admodum incurvæ, posteriores aliquanto majores.

Pedes gressorii producti, graciles, parce spinulosi.

Annulus primus caudalis maximam partem detectus.

Annulus analis lingulatus, post obscure crenulatus, supra subæquatus. Pedes anales longiusculi; ramus interior quam exterior multo longior et latior; ramus uterque post attenuatus, obscure crenulatus. Long. 11.5 mm.—SCHIŒDTE AND MEINERT, Nat. Tidsskr. (3), XII, 1879–80, p. 371.

ÆGA DENTATA Schiœdte and Meinert.

Æga dentata Schiœdte and Meinert, Naturh. Tidsskr. (3), XII, 1879–80, pp. 372–373, pl. x, figs. 11–12.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 522.

Locality.—Cuba.

Body ovate, punctate on the dorsal surface with minute scattered dots.

Front of head bisinuate, the median point separating and extending half the length of the first article of the first pair of antennæ.

The frontal lamina is rhomboid in shape.

The eyes are large, oblong, posteriorly acuminate, and contiguous along three series of ocelli.

The first pair of antennæ scarcely reach the posterior angle of the first thoracic segment; with the peduncle they extend to the fourth article, with the flagellum to the tenth article of the second pair of antennæ; the flagellum is composed of seven to eight articles, the first article being very long, slender, equaling in length the three following articles taken together.

The second pair of antennæ extend to the middle of the fifth epimeron; the flagellum is composed of twenty-one articles.

The first segment of the thorax is widely emarginate anteriorly on its dorsal surface; a great part of the dorsal surface of the seventh segment is concealed.

The epimera are rather wide; the posterior angles of the posterior epimera are somewhat acutely produced; the last epimeron extends beyond the first segment of the abdomen.

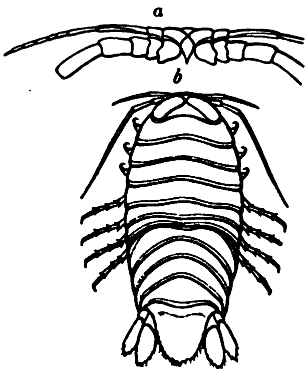

Fig. 161.—Æga dentata (After Schiœdte and Meinert). *a*, Frontal margin with both pairs of antennæ and frontal lamina. *b*, Young female. (Enlarged.)

The prehensible legs are slender, smooth; the basis is rather narrow; the anterior ungulæ are very small, the posterior ones somewhat larger and more incurved.

The ambulatory legs are rather long, robust, and furnished with scattered spines.

A large part of the first segment of the abdomen is concealed.

The terminal segment is produced linguiform, smooth above; at the base are two obscure depressions; the posterior margin is deeply crenulate, terminating in the middle in seven teeth. The uropoda are rather long; the inner branch is much longer and twice as wide as the outer branch, and posteriorly widely and obliquely rounded; both branches are furnished posteriorly with numerous rather obtuse teeth.

Length, 7.5 mm.[a]

ÆGA INCISA Schiœdte and Meinert.

Æga incisa Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XII, 1879–80, pp. 373–374, pl. x, figs. 13–15.—Harger, Bull. Mus. Comp. Zool. Harvard College, XI, 1883, No. 4, p. 96, pl. iii, fig. 1.—Richardson, American Naturalist, XXXIV, 1900, p. 218; Proc. U. S. Nat. Mus., XXIII, 1901, p. 522.

Localities.—Off Fernandina, Florida; off Georgia; off St. Augustine, Florida; latitude 31° 57′ north, longitude 78° 18′ 35″ west.

Depth.—263–440 fathoms.

Body oblong-ovate, about two and a half times longer than wide, 7 mm. : 18 mm.

Head about twice as wide as long, rounded anteriorly and produced in the middle in a small, narrow process, separating the basal articles of the antennæ and meeting the small frontal lamina on the other side. The eyes are large, oblong, and conspicuous, occupying almost the entire surface of the head and contiguous in the median line. The first two articles of the first pair of antennæ are small and equal in length; the third article is long and narrow, nearly three times as long as the second article. The flagellum is composed of sixteen articles.

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[a] The above description is adapted from the following one of Schiœdte and Meinert's:

Ovata, supra præter puncturam ordinariam punctis minutis, perraris sparsa.

Frons bisinuata, acumine procumbente dimidiam partem articuli primi antennarum primi paris discernente.

Lamina frontalis rhomboidalis. Oculi magni, oblongi, post acuminati, seriebus ternis ocellorum contigui.

Antennæ primi paris angulum posticum annuli primi trunci vix attingentes, scapo articulum quartum, flagello articulum decimum antennarum secundi paris explentes; flagellum 7–8—articulatum, articulo primo perlongo, tenui, articulos tres sequentes conjunctos longitudine æquante.

Antennæ secundi paris dimidiam partem epimeri quinti explentes; flagellum 21—articulatum. Segmentum dorsale annuli primi trunci ante late emarginatum; segmentum dorsale annuli septimi maximam partem obtectum.

Epimera latiuscula; anguli postici epimerorum posteriorum acuti, paulum producti; epimerum ultimum annulum primum caudalem explens. Pedes prensorii graciles, subglabri; femora angustiuscula; ungulæ primæ pusillæ, posteriores aliquanto majores magisque incurvæ.

Pedes gressorii longiusculi, robustiores, parce spinulosi. Annulus primus caudalis maximam partem obtectus. Annulus analis producte lingulatus, supra subæquatus, ad basin obscure bifoveolatus, margine terminali profunde crenulato, medio in dentes septem exeunte. Pedes anales longiusculi; ramus interior quam exterior multo longior et duplo latior, post in obliquum late rotundatus; ramus uterque post in dentes plures obtusiusculos desinens.

Long. 7.5 mm.—Schiœdte and Meinert, Nat. Tidsskr. (3), XII, 1879–80, pp. 372–373.

The first antennæ extend to the posterior margin of the first thoracic segment. The first two articles of the peduncle of the second pair of antennæ are short and about equal in length; the third is a little longer than the second; the fourth and fifth are subequal and each about twice as long as the third. The flagellum is composed of fifteen articles. The second pair of antennæ extend a little beyond the posterior margin of the second thoracic segment. The maxilliped has a palp of five articles. The frontal lamina is very small, somewhat cone-shaped, with base small and irregularly rounded and rather convex.

Fourth, fifth, and sixth segments of the thorax longer than the other four. The epimera of all the segments, from the second to the seventh, inclusive, are distinctly separated from the segments. The posterior angles of the last three segments are produced beyond the posterior margins of the segments, the posterior angle being very acute. In the last three segments a distinct carina extends obliquely from the outer posterior angle to the middle of the side adjacent to the segment. In the epimera of the three anterior segments the carina extends obliquely from the outer post-lateral angle to the inner antero-lateral angle.

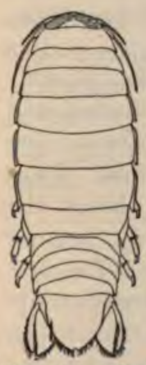

FIG. 162.—ÆGA INCISA (AFTER HARGER). × 3½.

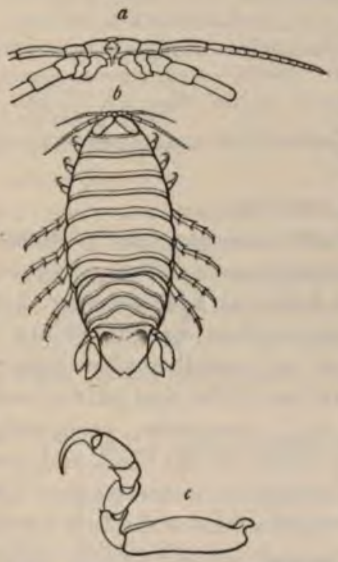

FIG. 163.—ÆGA INCISA (AFTER SCHIŒDTE AND MEINERT). *a*, FRONTAL LAMINA AND BOTH PAIRS OF ANTENNÆ. *b*, YOUNG FEMALE. *c*, LEFT LEG OF THIRD PAIR. (ENLARGED.)

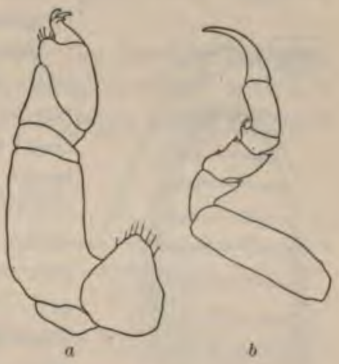

FIG. 164.—ÆGA INCISA. *a*, MAXILLIPED. × 39. *b*, SECOND LEG. × 11¼.

All six segments of the abdomen are distinct. The first is partly covered by the last thoracic segment. The lateral parts of the segments are not distinctly separated from the dorsal portion. The sixth or terminal segment is broadly triangulate, with a small round emargination at the apex. On either side of this emargination the posterior margin is denticulate and crenulate for a short distance. There are four spines on either side of the medium notch. The uropoda extend but a short distance beyond the tip of the terminal segment. The branches are equal in length. The outer branch is narrower than the inner one, and is pointed at its extremity. The inner branch is obliquely truncate, the inner post-lateral angle being widely rounded, the outer one being acute. Both are denticulate and furnished with numerous spines. The basal article of the uropoda extends about half the length of the terminal segment of the abdomen.

The first three pairs of legs are prehensile, the last four pairs ambulatory. In the first three pairs the carpus is armed with one spine, the merus with two.

ÆGA ARCTICA Lütken.

Æga Arctica LÜTKEN, Vid. Medd. Nat. For., 1859, p. 71, pl. 1A, figs. 1–3.—SCHIŒDTE and MEINERT, Naturh. Tidsskrift (3), XII, 1879–80, pp. 374–375.—HANSEN, Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 183–184.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 218; Proc. U. S. Nat. Mus., XXIII, 1901, p. 522.

Localities.—Umanek and Hundeöerne near Egedesminde, Greenland; also Iceland and Finmark.

Found on *Somniosus microcephalus.*

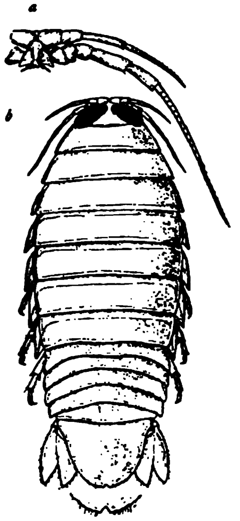

FIG. 165.—ÆGA ARCTICA (AFTER SARS). *a*, FIRST AND SECOND ANTENNÆ. *b*, GENERAL FIGURE. × ½.

Body oblong-ovate, nearly two and a half times longer than broad, 14 mm.: 34 mm.

Head twice as wide as long, 3 mm.: 6 mm., with the anterior margin widely rounded and produced in a small median point between the basal articles of the first pair of antennæ. Eyes large, oval, composite, occupying almost the entire surface of the head, and nearly, but not quite, contiguous in the median line. The first pair of antennæ have the first two articles short and subequal, neither article being dilated; the third article is a little longer than the first two taken together. The flagellum is composed of eighteen articles and extends almost to the middle of the first thoracic segment. The second pair of antennæ have the first three articles short and subequal; the fourth and fifth are subequal and each is about twice as long as the third. The flagellum is composed of twenty-five articles and extends to the posterior margin of the second thoracic segment. The maxilliped has a palp of five articles. The frontal lamina or inter-antennal plate is somewhat triangular in shape, the apex pointing downward on the ventral side, the base meeting the apex of the median point of the frontal margin.

The first three segments of the thorax are subequal, each being 3 mm. long. The fourth and seventh are subequal, and each is 3½ mm. in length. The fifth and sixth are each 4 mm. in length. The epimera are distinctly separated on all the segments with the exception of the first. They are broad plates, with the outer post-lateral angles of the first two and the last two acute. All are crossed obliquely by an arched carina.

All six segments of the abdomen are distinct. The sixth or terminal segment is rounded posteriorly, with a small round median notch. The uropoda do not extend beyond the extremity of the terminal abdominal segment. Both branches are of equal length. The inner one is a little wider than the outer branch. The margins are entire and crenulate, and furnished with spines. The outer post-lateral angle of both branches terminates in two small points.

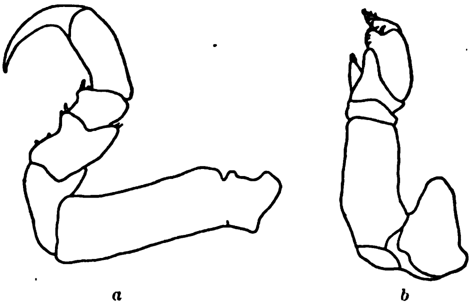

FIG. 166.—ÆGA ARCTICA. *a*, LEG OF SECOND PAIR. × 27½. *b*, MAXILLIPED. × 15½.

The first three pairs of legs are prehensile; the last four pairs are ambulatory. The merus of the first three pairs is armed with one large and one small spine, the carpus with one large and three small spines.

ÆGA GRACILIPES Hansen.

Æga gracilipes HANSEN, Isopoden, Cumaceen und Stomatopoden der Plankton Expedition, 1895, pp. 15–16, pl. I, figs. 6–6c.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 523.

Localities.—Gulf of Mexico; North Atlantic, latitude 59° north, longitude 8.5° west.

Depth.—730 fathoms; 1,524 meters (Hansen).

Body ovate, about twice as long as wide, 11 mm.: 21 mm.

Head with the anterior margin widely rounded, and produced in a narrow process, which arches over the antennæ, separating the basal articles, and meets the small frontal lamina on the other side. The eyes are large, oblong, composite, and occupy almost all of the dorsal surface of the head, extending from the lateral angles along the anterior margin and almost meeting in the median line. The first two articles of the first pair of antennæ are subequal; the third is nearly three times as long as the second. The flagellum is composed of eighteen articles. The first antennæ extend a little beyond the posterior margin of the first thoracic segment. The first two articles of the second antennæ are subequal; the third is a little longer than the second; the fourth is twice as long as the third; the fifth is a little shorter than the fourth. The flagellum is composed of eighteen articles. The second pair of antennæ extend to the posterior margin of the third thoracic segment. The frontal lamina or inter-antennal plate is about twice as broad as long, transversely placed, has the base somewhat oval in shape and directed anteriorly. The maxilliped has a palp of five articles.

The segments of the thorax are of nearly equal length, the first segment being a little longer and the seventh a little shorter than any of the others. The epimera are very distinctly separated on all the segments. They are broad plates, with very acute post-lateral angles, which in the last three epimera are produced beyond the posterior margin of the segment. There is a carina on all the epimera which extends from the post-lateral angle to the middle of the side adjacent to the segment in the last three and to the inner antero-lateral angle in the first two; in the third epimera it extends to a point about halfway between the middle of the side adjacent to the segment and the inner antero-lateral angle.

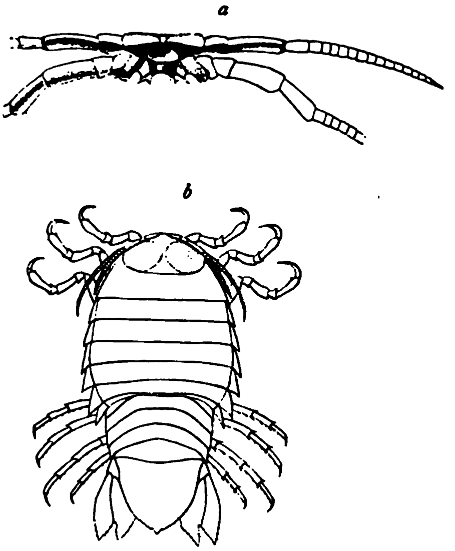

FIG. 167.—ÆGA GRACILIPES (AFTER HANSEN). *a*, FRONTAL PART OF HEAD FROM UNDERSIDE. *b*, GENERAL FIGURE. (ENLARGED.)

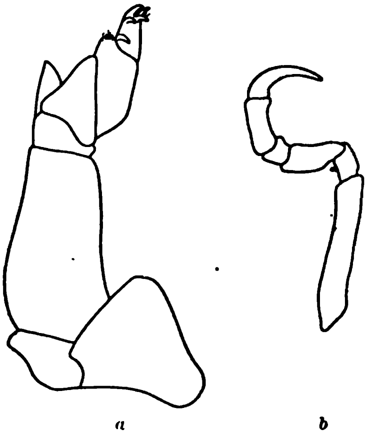

FIG. 168.—ÆGA GRACILIPES. *a*, MAXILLIPED, × 27½. *b*, LEG OF SECOND PAIR. × 9½.

All six segments of the abdomen are distinct, the first one being partly covered in the middle of the dorsal surface by the seventh thoracic segment. The lateral parts of the segments are not distinct from the dorsal portion. The sixth or terminal segment is broadly rounded at the sides with the posterior margin produced in the middle in an acute point. On either side of the median point the margin is denticulate and furnished with about five spines. The uropoda extend to the tip of the terminal segment. The branches are equal in length, and both are pointed at the posterior extremity. The inner branch is very slightly excavate on the exterior margin about 1 mm. from the extremity. Both branches are denticulate and furnished with spines.

The first three pairs of legs are prehensile, the last four pairs ambulatory. All the legs are very slender and free from spines.

ÆGA SYMMETRICA Richardson.

Æga symmetrica RICHARDSON, Bull. U. S. Fish Comm., XXIV, 1905, pp. 211–212.

Localities.—Vicinity of Naha Bay, Behm Canal, southeast Alaska; Queen Charlotte Sound, off Fort Rupert, Vancouver Island, British Columbia.

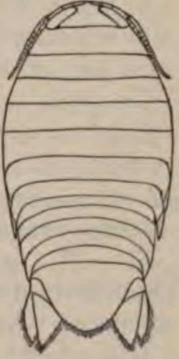

FIG. 169.—ÆGA SYMMETRICA. × 2⅓.

Body ovate, twice as long as broad. Color yellow, densely covered with light-brown dots, which form a regular line along the margin of each segment. Surface smooth. Head with frontal margin produced in a median point, which arches over the basal joints of the antennæ and meets the frontal lamina or interantennal plate on the underside. The eyes are narrow and elongate, composed of numerous ocelli. They are separated in front by a distance equal to the length of one eye. The first pair of antennæ extend to the posterior margin of the first thoracic segment; the joints of the peduncle are not dilated, although the first two joints are somewhat wider than the third, nor is there a process at the distal extremity of the second joint. The first two joints are of equal length; the third is as long as the first two together; the flagellum is composed of eleven joints. The second pair of antennæ reach the middle of the third thoracic segment; the flagellum is composed of sixteen joints. The frontal lamina or interantennal plate is conical, with the distal end flat, the proximal end produced to an acute point.

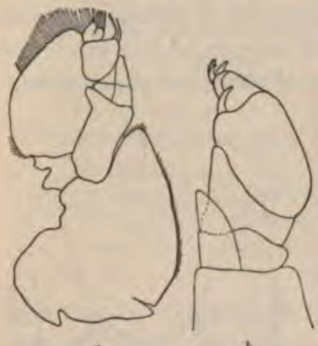

FIG. 170.—ÆGA SYMMETRICA. *a*, MAXILLIPED. × 27½. *b*, PALP OF SAME. × 51⅓.

The several segments of the thorax are about equal in length, the last one being slightly shorter. The epimera are large, subquadrate, with the outer distal angle of the last three produced posteriorly beyond the margin of their respective segments.

The first three pairs of legs have the propodus beset with three small spines along the inner margin; the carpus is short and armed with one spine; the merus is provided with five spines and the ischium has one long spine at the outer distal angle. The following four pairs of legs are long and slender, furnished with hairs at the distal extremity of the joints and armed with few spines.

The first five segments of the abdomen are short, the first is shortest, and the fifth the longest in the median dorsal line. The terminal or sixth segment of the abdomen is linguiform and rounded posteriorly with serrulated margin.

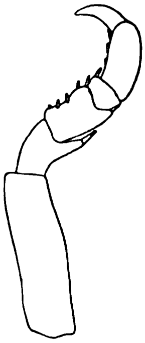

FIG. 171.—ÆGA SYMMETRICA. THIRD LEG. × 11½.

The uropoda extend a little beyond the posterior margin of the terminal abdominal segment; the outer branch is narrow, ovate, and pointed at the distal extremity; the inner branch is almost twice as wide as the outer one; both have serrulated margins.

Four specimens come from the U. S. Bureau of Fisheries steamer *Albatross* station 4228, vicinity of Naha Bay, Behm Canal, southeastern Alaska, and one from *Albatross* station 4199, Queen Charlotte Sound, off Fort Rupert, Vancouver Island, British Columbia, at depths of 41 to 107 fathoms. The type specimen is in the U. S. National Museum (Cat. No. 29247). The following note by Mr. Harold Heath accompanies the Fort Rupert specimen: "Eyes black. Rusty-brown spots on dorsal surface. Vermilion-colored ovary (?) shows through translucent cuticle."

Only two other species of *Æga* are known in the Pacific coast fauna of North America, *Æga lecontii* (Dana)[a] and *Æga microphthalma* Dana.[b] The present species differs from *Æga lecontii*, (1) in the greater length of both pairs of antennæ; those of the first pair reach to the posterior margin of the first thoracic segment, instead of to the end of the peduncle of the second pair or almost to the posterior margin of the head, and those of the second pair reach to the middle of the third thoracic segment instead of almost to the posterior margin of the first; (2) in having neither the basal joints of the peduncle of the first pair of antennæ greatly dilated nor the second joints with a process at the apex extending nearly the length of the third joint; (3) in the much shorter body, as compared with the width; (4) in having the terminal segment rounded, not truncate, at the apex; (5) in the longer uropoda; (6) in having the median point of the frontal margin of the head arch over the basal joints of the antennæ to meet the frontal lamina on the ventral side, and (7) in the different shape of the frontal lamina.

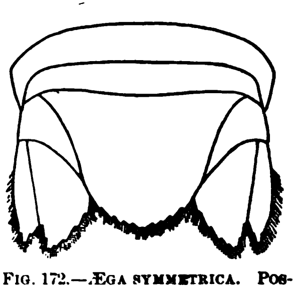

FIG. 172.—ÆGA SYMMETRICA. POSTERIOR PART OF ABDOMEN. × 6¼.

The present species differs from *A. microphthalma* in the longer first pair of antennæ, which reach the posterior margin of the first

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[a] Proc. U. S. Nat. Mus., XXI, 1899, pp. 826–827.

[b] Proc. Acad. Nat. Sci. Phila., VII, 1854, p. 176.

thoracic segment; in Dana's species they are shorter than the basal part (peduncle) of the external or second pair of antennæ; in the larger eyes, which are narrow and elongate instead of being round and very small; in the longer uropoda, the branches in *A. microphthalma* scarcely surpassing the abdomen; in not having the apex of the inner branch "faintly arcuate obliquely" and in having all six segments of the abdomen visible in a dorsal view, only five being apparent in *A. microphthalma*.

This species differs from *Æga longicornis* Hansen in the shorter second antennæ, which extend only to the middle of the third thoracic segment, while in *A. longicornis* they extend to the middle of the fifth thoracic segment; in having the first three pairs of legs furnished with a greater number of spines than in Hansen's species; in having both branches of the uropoda terminating in a bifid extremity, while in *A. longicornis* the extremities of the uropoda are acute, and in having the apex of the terminal abdominal segment bifid instead of acutely pointed.

A specimen from off Santa Cruz Island, California, agrees with the specimens from Alaska, with the exception that the second antennæ have fourteen instead of sixteen articles to the flagellum. They are, however, just as long, extending to the middle of the third thoracic segment.

ÆGA VENTROSA M. Sars.

Æga ventrosa M. Sars, Chr. Vid. Selsk. Förh., 1858–59, pp. 154–156.—Schiœdte and Meinert, Natur. Tidsskr. (3), XII, 1879–80, pp. 375–377, pl. IX, figs. 7–8.

Ægiochus nordenskiöldii Bovallius, Bihang Sv. Vet.-Akad. Handl., X, 1885, No. 9, p. 5, pl. I–II.

Æga loveni Bovallius, Bihang Sv. Vet.-Akad. Handl., XI, No. 17, 1886–87, pp. 3–6, pl. I, figs. 1–10.

Ægiochus ventrosus Bovallius, Bihang Sv. Vet.-Akad. Handl., XI, No. 17, 1886–87, pp. 8–9.

Æga nordenskiöldii Hansen, Vidensk. Meddel. Naturh. Foren. i Kjøbh., 1887–88, pp. 184–187.

Æga ventrosa G. O. Sars, Crust. Norway, II, 1899, p. 64, pl. XXVI, fig. 3.—Richardson, American Naturalist, XXXIV, 1900, p. 218; Proc. U. S. Nat. Mus., XXIII, 1901, p. 522.—Norman, Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 432.

Localities.—Greenland; latitude 59° 33′ north, longitude 43° 25′ west; also coast of Norway; Finland.

Depth.—120 fathoms; 203–312 fathoms (Norman).

Body oblong-ovate, about two and one-third times longer than wide, 13 mm.: 30 mm.

Head twice as wide as long, 3 mm.: 6 mm. In the median line the front is produced in a process which arches over the antennæ, separating the basal articles, and meets the frontal lamina or interantennal plate at its upper end. The eyes are large, irregularly oval, composite, situated in the lateral angles of the head and extending along the anterior margin, being separated in front by a distance equal to the length of one eye. The basal article of the peduncle of the first pair of antennæ is larger and a little longer than the second article; the third article is very slender and about twice as long as the second article. The flagellum is composed of about fourteen articles. The first pair of antennæ extend a little beyond the end of the peduncle of the second pair, to the end of the fourth article of the flagellum, or two-thirds the length of the first thoracic segment. The first three articles of the peduncle of the second pair of antennæ are subequal; the fourth article is twice as long as the second; the fifth is one and a half times longer than the fourth. The flagellum is composed of twenty-five articles. The second antennæ extend a little beyond the posterior margin of the third thoracic segment. The frontal lamina is cone-shaped, the base of the cone being large and conspicuous, directed anteriorly and slightly concave. The frontal process of the head slightly overlaps the edge of the base of the cone.

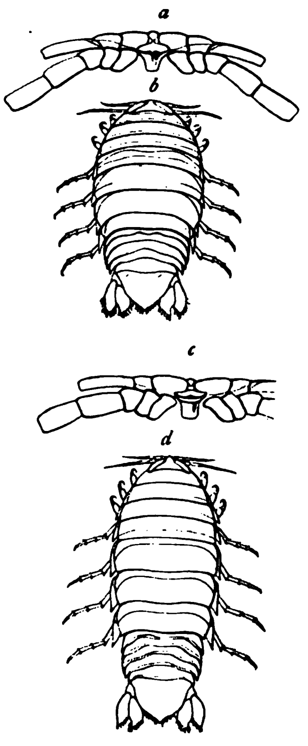

Fig. 173.—Æga ventrosa (after Schiœdte and Meinert). *a*, Frontal margin with both antennæ and frontal lamina of adult female. *b*, Adult female. *c*, Frontal margin with both antennæ and frontal lamina of young female. *d*, Young female. (All enlarged.)

The first, fourth, fifth, and sixth segments are somewhat longer than any of the others. The post-lateral angles of the first segment are very acute. The epimera of all the segments, from the second to the seventh, inclusive, are distinctly separated off from the segments. They are broad plates occupying the entire lateral margins of the segments. In all, the post-lateral angles are acute, but especially so in the epimera of the second, third, and seventh segments. In all the epimera there is a distinct carina, extending from the outer post-lateral angle to about the middle of the side adjacent to the segment in the last four, but to the inner antero-lateral angle in the first two. The epimeron of the seventh segment is produced posteriorly beyond the posterior margin of the segment.

All six segments of the abdomen are distinct, although the first is partly covered dorsally in the middle by the seventh thoracic segment. The lateral parts of these segments are not separated off from the dorsal portion, but are completely fused. The terminal segment is broadly rounded posteriorly with a small point in the middle. The posterior margin is crenulate. The peduncle of the uropoda has the inner part produced a little beyond the middle of the sixth segment of the abdomen. The outer branch is half as wide as the inner branch; it is pointed at the extremity. The inner branch has the posterior extremity obliquely truncate. Both branches are equal in length and crenulate; they do not extend beyond the tip of the abdomen. The first three pairs of legs are prehensile; the last four pairs ambulatory. In the first three pairs the propodus is furnished with one spine, the carpus with one, the merus with three.

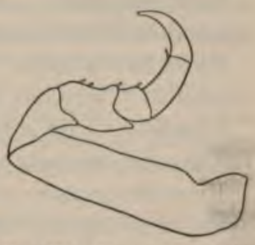

FIG. 174.—ÆGA VENTROSA. LEG OF SECOND PAIR.

ÆGA MICROPHTHALMA Dana.

Æga microphthalma DANA, Proc. Acad. Nat. Sci. Phila., VII, 1854, p. 176.—STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 508.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 826; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 167; American Naturalist, XXXIV, 1900, p. 218.

Locality.—Monterey, California.

The eyes are rounded, very small. The body above is bare, smooth. The second pair of antennæ are rather long; the flagellum is composed of nearly twenty-four articles; the first pair of antennæ are shorter than the peduncle of the second pair. The legs are almost bare, the anterior ones are short, with the fourth article armed on the inferior margin with five to six very short, spine-form teeth; the eight posterior ones are short, beset with spines at the apex of the articles. The abdomen is composed of four segments, the posterior segment being triangulate, with apex rounded and pubescent, and with the sides rather straight. The uropoda are armed at the base with a slender and long spine scarcely shorter than the branches; the branches extend very little beyond the abdomen, are furnished with short hairs, the inner branch is wide, with apex obliquely arcuate, the outer branch half as wide as the inner branch, short and lanceolate. Length 6‴.[a]

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[a] The above description is adapted from the following one of Dana's:

Oculi subrotundi, parvuli. Corpus superficie nudum, læve. Antennæ externæ longiusculæ, flagello ferme 24 articulato; internæ basi externarum breviores. Pedes fere nudi; antici breves, articulo 4to, 5–6 dentibus spiniformibus brevissimus infra armato; 8 postici breves, apice articulorum spinulosi. Abdomen 4 articulatum, segmento postico triangulato apice rotundato et pubescente, lateribus rectiusculis. Styli caudales spinâ tenui et longâ ramis parce breviore ad basin armati; ramis abdomen vix superantibus, breviter ciliatis, interno lato, apice oblique leviter arcuato, externo dimidio angustiore, breviter lanceolato.—Long. 6.‴

The six epimerals either side are large, and, excepting the two anterior, they project behind, beyond the segment to which they belong. The eight hinder legs are naked, excepting the spines at apex and one or two sets of minute spines on the under side of some of the joints.—DANA, Proc. Acad. Nat. Sci. Phila., VII, 1854, p. 176.

31. Genus ROCINELA Leach.

Body depressed. Abdomen not much narrower than thorax. Eyes present, well developed, and conspicuous.

First two articles of the peduncle of the first pair of antennæ not expanded. Frontal lamina small and narrow.

Mandibles with a linguiform lamella (molar expansion?). Palp of the maxillipeds composed of two articles.

First three pairs of legs with propodus more or less expanded and armed with spines: dactylus forming a very large, evenly curved hook. Four posterior pairs with the propodus short.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ROCINELA.

a. Eyes contiguous .... *Rocinela oculata* Harger

a'. Eyes not contiguous.

b. Flagellum of second pair of antennæ composed of from fourteen to sixteen articles.

c. First thoracic segment with antero-lateral angles produced horn-like at sides of head .... *Rocinela cornuta* Richardson

c'. First thoracic segment with antero-lateral angles not produced horn-like at sides of head.

d. Propodus of prehensile legs armed with from two to four spines.

e. Eyes very close together .... *Rocinela insularis* Schiœdte and Meinert

e'. Eyes widely separated.

f. Head bicarinated, the two carinæ being separated by a longitudinal median groove .... *Rocinela dumerilii* (Lucas)

f'. Head without carinæ.

g. Front of head produced in a widely rounded spatulate process. Two tubercles on head .... *Rocinela cubensis* Richardson

g'. Front of head not produced in a widely rounded spatulate process. No tubercles on head.

h. Spots present on both sides of the fourth thoracic segment. *Rocinela maculata* Schiœdte and Meinert

h'. Spots wanting on both sides of the fourth thoracic segment.

i. Spots present on fourth and fifth abdominal segments and base of terminal segment .... *Rocinela belliceps* (Stimpson)

i'. Spots wanting on fourth and fifth abdominal segments and base of terminal segment.. *Rocinela americana* Schiœdte and Meinert

d'. Propodus of prehensile legs armed with from four to six spines or with as many teeth.

e. Propodus of prehensile legs armed with a process the edge of which is furnished with six teeth, meeting squarely and without interval. *Rocinela propodialis* Richardson

e'. Propodus of prehensile legs not armed with denticulate process, but furnished with spines.

f. Abdomen much longer than wide. Outer branch of uropoda one and a half times wider than inner branch. Propodus of prehensile legs armed with five or six spines. Abdomen broad when compared with thorax, last segment widely rounded. Second antennæ extend to the middle of the third thoracic segment...... *Rocinela laticauda* Hansen *f′*. Abdomen about as wide as long. Outer branch of uropoda twice as wide as inner branch. Propodus of prehensile legs armed with four spines. Abdomen narrow when compared with thorax, tapering, last segment narrowly rounded. Second antennæ extend to the middle of the second thoracic segment.......*Rocinela angustata* Richardson

b′. Flagellum of second pair of antennæ composed of from ten to eleven articles.

c. Small tubercles present on the posterior margins of all the segments of the thorax. Propodus of prehensile legs armed with three spines. *Rocinela tuberculosa* Richardson

c′. No tubercles on body. Propodus of prehensile legs unarmed or armed with only one spine.

d. Terminal segment of abdomen ornamented with a pair of narrow semilunar bands, separated by a longitudinal stripe. Propodus of prehensile legs unarmed.......................*Rocinela signata* Schiœdte and Meinert

d′. Terminal segment of abdomen ornamented with a very wide crescentiform band from the posterior border of which three large hastiform stripes project backwards. Propodus of prehensile legs armed with one spine. *Rocinela aries* Schiœdte and Meinert

ROCINELA OCULATA Harger.

Rocinela oculata HARGER, Bull. Mus. Comp. Zool., Harvard College, XI, No. 4, 1883, pp. 97–99, pl. III, fig. 2–2a; pl. IV, fig. 1.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 219; Proc. U. S. Nat. Mus., XXIII, 1901, p. 523.

Locality.—Latitude 32° 18′ 20″ north, longitude 78° 43′ west.

Depth.—252 fathoms.

"Body oval, length a little more than twice the breadth, surface sparsely punctate.

"Head subreniform, produced in front into a truncated process over the bases of the antennulæ, yoke-shaped behind, the ocular lobes projecting, upper surface nearly covered with the large eyes in which the ocelli are large and quincuncially arranged in ten rows along the long axis of each eye. Five of these rows meet along the median line.

"The antennulæ are slender and scarcely attain the tip of the antennal peduncle; the basal segment is short and concealed from above; the second is longer than the first; the third is slender, but not as long as the first two together; flagellum about as long as the peduncle, slender and composed of five segments, of which the first is much the longest and the last is the shortest, and does not quite attain the posterior border of the eye when the antennula is reflexed. The antennæ surpass the first thoracic segment; the first two segments are very short; the flagellum is about twelve-jointed.

"First thoracic segment closely adapted to the head in front; fourth segment longest in the median line above; sixth short; seventh nearly concealed and quite small, although bearing a well-developed pair of legs below.

"The epimera of the second and third segments are oblique, but not acute nor produced backward in a lateral view; in the four following segments they are produced and very acute; the seventh epimeron much smaller than the sixth, and, owing to the shortness of the seventh segment, ends behind about on a line with it, both epimera surpassing the first segment of the pleon.

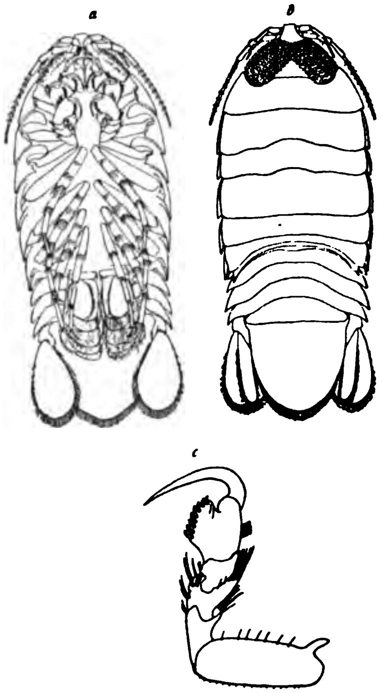

FIG. 175.—ROCINELA OCULATA (AFTER HARGER). a, VENTRAL VIEW. × 4. b, DORSAL VIEW. × 4. c, LEG OF FIRST PAIR. × 10.

"Legs of the first pair slender, armed with a long slender dactylus, much curved near its base; propodus expanded with a large palmar lobe armed with a marginal row of eight curved spines; carpus short, with a single curved palmar spine. Legs of the second and third pair much like the first, but with only six spines on the propodus. Legs of the fourth and posterior pairs slender, armed with spines principally at the distal ends of the ischium, merus, and carpus.

"First segment of the pleon very short and nearly concealed by the thoracic segments, narrower than the next three segments, which are about equal, acutely produced at the sides so as to resemble in shape the seventh epimeron; fifth segment narrower than fourth, but somewhat longer on the median line; telson semi-oval, regularly rounded behind and ciliated. Uropods equaling the telson; inner angle of basal segment produced, about one-third the length of the inner ramus, which is lingulate, rounded behind, slightly shorter than the outer, and less than half as broad; outer ramus subovate, spinulose along the outer border; both rami ciliated except near the base.

Length, 13.5 mm.; breadth, 6 mm.

A single specimen of this species, the only one as yet known, was taken at Station 305, latitude 32° 18′ 20″ north, longitude 73° 43′ west, from a depth of 252 fathoms."—HARGER.[a]

ROCINELA CORNUTA Richardson.

Rocinela cornuta RICHARDSON, Proc. Amer. Philos. Soc., XXXVII, 1898, p. 12, figs. 1-2; Proc. U. S. Nat. Mus., XXI, 1899, p. 827; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 169; American Naturalist, XXXIV, 1900, p. 219.

Locality. Off Shumagin Bank, Alaska.

Depth.—625 fathoms.

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[a] Bull. Mus. Comp. Zool. Harvard College, XI, No. 4, Pt. 23, 1883, pp. 97-98.

Length of body two and one-quarter times its greatest breadth. Outline oval; surface smooth, with scattered points of depression. Head subtriangular, having a medium excavation. Its frontal margin is produced forward in a long and broad projection, widely rounded at its extremity, and curving upward. Eyes large and situated some distance apart. The first antenna reaches the anterior margin of the first thoracic segment; its flagellum is composed of six articles. The second antenna extends to the posterior margin of the second thoracic segment; its flagellum is sixteen-jointed.

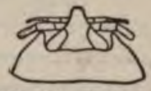

FIG. 176.—ROCINELA CORNUTA. HEAD. × 1⅜.

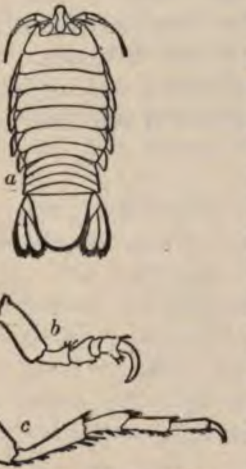

FIG. 177.—a, ROCINELA CORNUTA, MALE, SLIGHTLY REDUCED. b, LEG OF FIRST PAIR. × 4. c, LEG OF FOURTH PAIR. × 4.

The thoracic segments are subequal, The antero-lateral angles of the first segment are greatly produced and extend forward a little less than half the length of the head, including the projection. These antero-lateral projections of the first segment do not follow closely the lines of the head, but rather extend out straight in a direction which is parallel to that of the frontal projection of the head. The extremities of these projections are rounded. The epimera of all the segments point downward and do not extend beyond the post-lateral angle of their respective segments with the exception of the sixth and seventh ones.

The first segment of the abdomen is almost entirely covered by the seventh thoracic segment. The last segment is rounded posteriorly and is faintly crenulate. The two branches of the uropods are similar in shape and size; the inner branch, being the longer, reaches the extremity of the abdomen. The uropods as well as the abdominal segments are furnished with hairs.

The propodus of the prehensile feet is armed with three spines, and three blunt ones are found on the merus. The gressorial feet are long and slender and covered with spines.

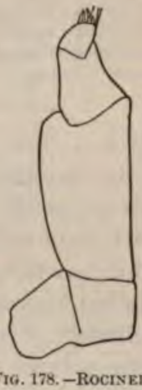

FIG. 178.—ROCINELA CORNUTA. MAXILLIPED. × 20¼.

Type.—The type specimen was found off Shumagin Bank, Alaska, Station 3338, 625 fathoms (Cat. No. 20086, U.S.N.M.).

ROCINELA INSULARIS Schiœdte and Meinert.

Rocinela insularis Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XII, 1879–80, pp. 390–391, pl. xii, figs. 1–3.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 523.

Localities.—West Indies; between Delta of the Mississippi and Cedar Keys, Florida; off Fernandina, Florida.

Depth.—227–273 fathoms.

Body oblong-ovate, about two and a half times longer than wide, 10 mm.: 25 mm.

Head, two and a half times wider than long, 2 mm.: 5 mm.; triangular in shape, the front produced over the basal articles of the antennæ. Eyes large, composite, oval, and occupying a large part of the dorsal surface of the head, being very close together in front, but not contiguous. Basal article of first antenna small and almost entirely concealed by the front of the head; second article twice as long as first; third article nearly twice as long as second. Flagellum is composed of six articles. The first pair of antennæ extend to the end of the peduncle of the second antennæ, or to the antero-lateral angle of the first thoracic segment. The second pair of antennæ have the first two articles short, the first article a little longer than the second; the third is twice as long as the first; the fourth is but little longer than the third; the fifth is one and a half times longer than the fourth. The flagellum is composed of fifteen articles. The second antennæ extend to the posterior margin of the second thoracic segment. The frontal lamina is small and almost inconspicuous. It is rhomboid-shaped at the base and ventrally placed. The maxilliped has a palp of two articles.

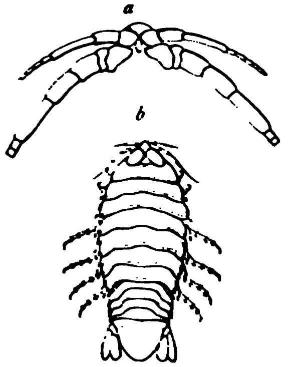

Fig. 179.—Rocinela insularis. After Schiœdte and Meinert. a. Frontal margin with both pairs of antennæ and frontal lamina. b, Adult male. Enlarged.

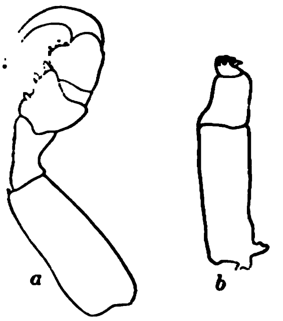

Fig. 180.—Rocinela insularis. a, Second leg. × 11½. b, Maxilliped. × 20½.

The first three segments of the thorax are subequal; the fourth is slightly longer than any of the preceding ones; the last three are the largest. The epimera are distinct from the segments. They are narrow plates, with the posterior extremities very acute in the last four. The first two have the posterior extremities rounded. The epimera of the seventh segment are produced beyond the posterior margin of the segment. They are all crossed obliquely by faint carinæ.

All six segments of the abdomen are distinct and visible. The first is almost entirely covered in the middle by the seventh thoracic segment, but is uncovered at the sides. The sixth or terminal segment is posteriorly rounded. The uropoda do not extend beyond the extremity of the terminal segment. The outer branch is a little shorter and narrower than the inner branch; both are rounded at the posterior extremity and furnished with spines. There are also a few spines on the posterior margin of the terminal segment of the body. The peduncle of the uropoda extends about two-thirds the length of the terminal abdominal segment.

The first three pairs of legs are prehensile, the last four pairs ambulatory. The first pair of legs have two spines on the propodus, the second and third pairs have three; all three anterior pairs of legs have three spines on the merus. The ambulatory legs are beset with spines.

ROCINELA DUMERILII (Lucas).

Acherusia dumerilii LUCAS, Expl. Sc. Algér., Zool., I, 1849, p. 79, pl. VII, fig. 3.

Acherusia complanata GRUBE, Ins. Lussin Meeresf., 1864, p. 76.

Rocinela dumerilii SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XII, 1879–80, pp. 391–393, pl. XII, figs. 4–6.—BOVALLIUS, Bihang till k. Sv. Vet.-akad. Handl., XI, 1886–87, No. 17, pp. 9–10.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 524.—NORMAN, Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 436.

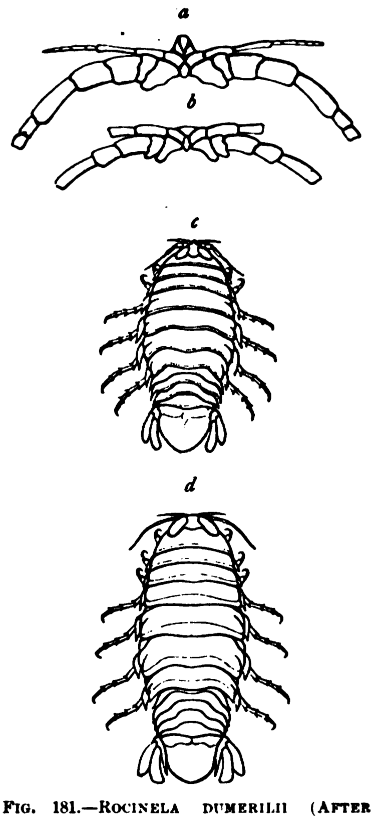

FIG. 181.—ROCINELA DUMERILII (AFTER SCHIŒDTE AND MEINERT). *a*, FRONTAL MARGIN WITH BOTH ANTENNÆ AND FRONTAL LAMINA OF ADULT FEMALE. *b*, SAME OF YOUNG FEMALE. *c*, ADULT FEMALE. *d*, YOUNG FEMALE. (ENLARGED.)

Localities.—Off Habana, Cuba; also Mediterranean Sea; Adriatic Sea; in the Atlantic Ocean, latitude 36° 47′ 7″ north, longitude 14° 7′ 2″ west; Vasco de Gama Pt. "S. 75° E., 13½ miles" (Stebbing).

Depth.—230 fathoms. Nature of bottom, fine gray sand.

Body oblong, ovate, twice as long as wide, 15 mm. : 30 mm.

Head not quite twice as wide as long 4 mm. : 7 mm., somewhat triangular in shape, with the front produced over the basal articles of the antennæ. The eyes are large, oval, composite, and not contiguous, but separated in front by two high, conspicuous carinæ, each carina extending along the anterior edge of the eye, being somewhat divergent and divided by a median longitudinal depression. The anterior margin of the head between the eyes is three-lobed, the median lobe being slightly anterior to the other two. The first pair of antennæ have the basal article short and almost inconspicuous; the second article is almost twice as long as the first; the third is twice as long as the second. The flagellum is composed of seven articles. The first antennæ extend to the middle of the fifth article of the peduncle of the second pair of antennæ. The first two articles of the second pair of antennæ are short, the second one shorter than the first; the third and fourth are about equal in length and twice as long as the first; the fifth article is a little longer than the fourth. The flagellum is composed of fifteen articles. The second antennæ extend to the middle of the third thoracic segment. The frontal lamina is small and almost inconspicuous; it is rhomboid-shaped and ventrally placed. The maxilliped has a palp of two articles.

The fourth, fifth, and sixth thoracic segments are a little longer than any of the others. The epimera in all the segments from the second to the seventh inclusive are distinct and have the posterior extremities very acute, the angle being sharper in the last four. In the last three segments the epimeron is produced beyond the posterior margin of the segments. A carina extends obliquely across all the epimera.

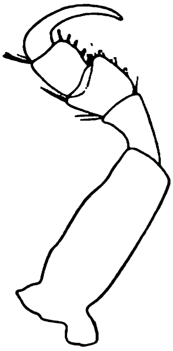

Fig. 182.—Rocinela dumerilii. Leg of second pair. × 9½.

The first segment of the abdomen is almost entirely covered by the seventh thoracic segment except at the sides. The lateral parts are not separated from the dorsal portion of the segments. The sixth or terminal segment is narrowly rounded at the extremity; its posterior margin is furnished with spines. The uropoda extend to the tip of the abdomen. The branches are equal in width, but the inner one is a little longer than the outer one. Both are furnished with spines. The peduncle extends as far as the extremity of the outer branch.

The first three pairs of legs are prehensile, the last four pairs ambulatory. In the three anterior pairs, the propodus is armed with four spines, the carpus with one, and the merus with three. The ambulatory legs are furnished with numerous spines.

ROCINELA CUBENSIS Richardson.

Rocinela cubensis RICHARDSON, Proc. Amer. Philos. Soc., XXXVII, 1898, pp. 13–14; Proc. U. S. Nat. Mus., XXIII, 1901, p. 523.

Locality.—Off Habana.

Depth.—143 fathoms.

Outline of body oval, surface smooth.

Head with rounded lateral margins. Its anterior margin is produced forward in a large rounded projection, the breadth of which is equal to its length, and the upper surface deeply concave with upturned edges. This projection extends forward for about half its length and then upward, the change in direction being gradual. Eyes large and composed of ten rows of ocelli. Two small tubercles are situated between the eyes, and in the middle of the head and back of these is an arc-shaped depression. The first antenna reaches the posterior margin of the head; its flagellum is composed of six articles. The second antenna extends to the posterior margin of the third thoracic segment; its flagellum is composed of fifteen articles.

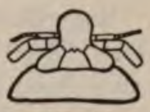

FIG. 183.—ROCINELA CUBENSIS. HEAD.

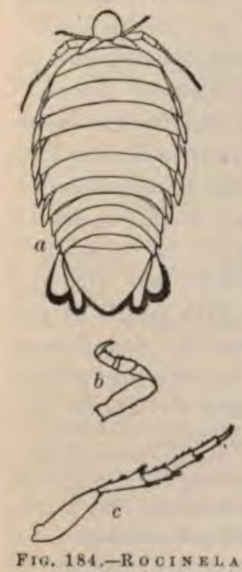

FIG. 184.—ROCINELA CUBENSIS. *a*, MALE. × 2¼. *b*, LEG OF FIRST PAIR. × 4⅓. *c*, LEG OF FOURTH PAIR. × 4⅓.

The thoracic segments are subequal in length. The epimera are long and narrow, with very acute posterior angles.

The first segment of the abdomen is almost entirely concealed by the last thoracic segment. The fifth is likewise covered at the sides by the fourth segment. The last abdominal segment is triangular in shape with a rounded posterior margin. The outer branch of the uropods is very broad and oar-shaped, with a rounded extremity. The inner branch is long and slender, of equal breadth throughout its length and rounded on its posterior margin. The inner branch is the longer one. Both are fringed with hairs.

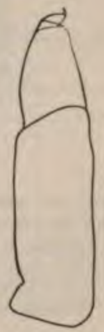

FIG. 185.—ROCINELA CUBENSIS. MAXILLIPED. × 39.

In the prehensile legs of this species the basis presents a row of tubercles on the superior margin. There are two spines on the propodus, one on the carpus, and two on the merus. The gressorial legs are but slightly spinulose.

Type.—The type specimen was found off Habana, latitude 23° 11′ north, longitude 82° 19′ 6″ west, Station 2341, 143 fathoms (U.S.N.M., Cat. No. 20087).

ROCINELA MACULATA Schiœdte and Meinert.

Rocinela maculata SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XII, 1879-80, p. 393, pl. XII, figs. 10-12.—BOVALLIUS, Bihang till Kgl. Sv. Vet. Akad. Handling., X, No. 11, 1885, p. 10, pl. II, figs. 18-23.—HANSEN, Vidensk. Meddel. naturh. Foren. i. Kjøbh., 1887, p. 187.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 219; Proc. U. S. Nat. Mus., XXIII, 1901, p. 524.

Localities.—West Greenland; Vladivostok; east Asia.

Body short, ovate, punctate on the dorsal surface, with minute scattered dots; the dorsal surface of the fourth thoracic segment is ornamented on either side with an obscure subocellate spot; the last segment of the abdomen is marked at the base on either side with an obscure spot.

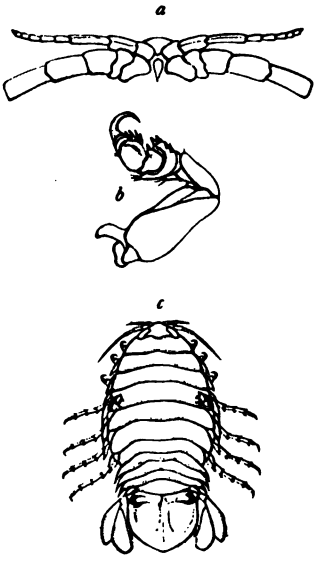

FIG. 186.—ROCINELA MACULATA (AFTER SCHIŒDTE AND MEINERT). *a*, FRONTAL MARGIN WITH BOTH ANTENNÆ AND FRONTAL LAMINA. *b*, RIGHT LEG OF SECOND PAIR. *c*, ADULT MALE. (ENLARGED.)

The front of the head is triangular, with the apex widely obtuse, smooth above.

The frontal lamina is minute, narrowly rhomboidal in shape.

The eyes are minute, pentagonal in shape, separated by a distance equal to a third part of the width of the head. The first pair of antennæ with the four last articles extend beyond the anterior angle of the first thoracic segment, reaching with the peduncle as far as a third part of the fourth article, and with the flagellum as far as the fifth article of the second pair of antennæ; the flagellum is composed of six articles, the first article being a little longer than the second, the last article being the smallest.

The second pair of antennæ extend to the end of the first epimeron; the flagellum is composed of fifteen articles.

The first segment of the thorax is slightly bisinuated anteriorly on the dorsal surface.

The epimera are rather large, and rather wide; the posterior angles of the posterior epimera are very acutely produced; the last epimeron extends two parts of the length of the second segment of the abdomen.

The prehensile legs are short; the merus is short, and armed with three or four rather stout, obtuse spines; the propodus is furnished along the edge with four long, acute spines; the ungulæ are rather large, slender, ornamented with four carinæ, somewhat incurved and subequal. The ambulatory legs are rather long, rather stout, furnished with short spines. The first segment of the abdomen is almost entirely concealed.

The last segment of the abdomen is short, lingulate, smooth above, and with two depressions at the base.

The uropoda are rather long and large; the inner branch is a little longer and wider than the outer branch and is posteriorly truncate; both branches are crenulated on the exterior margin.

Length, 23 mm.[a]

ROCINELA BELLICEPS (Stimpson).

Æga belliceps STIMPSON, Proc. Acad. Nat. Sci. Phila., XVI, 1864, p. 155.

Æga alascensis LOCKINGTON, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 46.

Rocinela alascensis RICHARDSON, Proc. Am. Philos. Soc., XXXVII, 1898, p. 11.

Rocinela belliceps RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 827; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 169; Amer. Naturalist, XXXIV, 1900, p. 219; Harriman Alaska Exp. Crust., X, p. 214; Proc. U. S. Nat. Mus., XXVII, 1904, p. 214; Bull. U. S. Fish Comm., XXIV, 1905, p. 213.

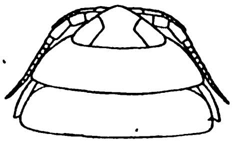

FIG. 187.—ROCINELA BELLICEPS. HEAD AND FIRST TWO THORACIC SEGMENTS. × 2½.

Localities.—Cortes Bank, California to Alaska and Bering Sea; Yakutat, Alaska; Unalga Pass, Aleutians.

Parasite of cod and sculpin; from the fish *Hydrolagus colliei.*

Depth. —5–688 fathoms. Rocky beach under stones; shelly sand, mud, and gravel; in low water; in brown and green mud, red sand.

Body oblong-ovate, a little more than twice as long as wide, 10 mm. : 22 mm.

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[a] The above description is adapted from the following one of Schiœdte and Meinert's:

Breviter ovata, supra præter puncturam ordinariam punctis minutis, perraris sparsa; segmentum dorsale annuli quarti trunci utrinque macula obscura, subocellata ornatum; annulus analis ad basin utrinque macula obscura notatus.

Frons triangula, apice late obtusa, supra æquata.

Lamina frontalis minuta, anguste rhomboidalis.

Oculi minuti, pentagoni, tertia parte latitudinis capitis distantes. Antennæ primi paris articulis quaternis ultimis angulum priorem annuli primi trunci superantes, scapo tertiam partem articuli quarti, flagello articulum quintum antennarum secundi paris explentes; flagellum 6-articulatum, articulo primo quam secundo paulo longiore, articulo ultimo minimo.

Antennæ secundi paris epimerum primum explentes; flagellum 15-articulatum. Segmentum dorsale annuli primi trunci ante leviter bisinuatum.

Epimera majuscula, latiuscula; anguli postici epimerorum posteriorum acuti, valde producti; epimerum ultimum duas partes annuli secundi caudalis explens.

Pedes prensorii breves: femora brevia, aculeis ternis quaternisve crassiusculis, obtusis armata; tarsi in acie aculeis quaternis longis, acutis instructi; ungulæ majusculæ, graciles, quadricarinatæ, admodum incurvæ, inter se subæquales. Pedes gressorii longiusculi crassiusculi, breviter spinulosi. Annulus primus caudalis fere totus obtectus.

Annulus analis breviter lingulatus, supra subæquatus, ad basin bis impressus.

Pedes anales longiusculi, magni; ramus interior quam exterior paulo longior atque latior, post truncatus; ramus uterque in latere exteriore crenulatus.

Long. 23 mm.—SCHIŒDTE AND MEINERT, Nat. Tidsskr. (3), XII, 1879–80, p. 393.

Head somewhat triangular in shape, one and two-thirds times wider than long, 3 mm. : 5 mm. Front of head obtusely produced over the basal articles of the antennæ, partly concealing these articles. The eyes are large, oval, composite, situated in the post-lateral angles of the head and extending along the side a little beyond the middle of the lateral margin. They are separated anteriorly by a distance equal to one-third the width of the head at the base. The basal article of the first antennæ is almost entirely concealed by the front of the head; the second article is short; the third is one and a half times longer than the second. The flagellum is composed of four articles. The first antennæ extend almost to the posterior margin of the head. The second pair of antennæ have the first two articles short, the second one a little shorter than the first; the third and fourth are subequal and each is about twice as long as the first; the fifth is about one and a half times as long as the fourth. The flagellum is composed of fourteen articles. The second antennæ extend to the posterior margin of the second thoracic segment. Frontal lamina very small, minute, rhomboid-shaped at its base and ventrally placed. The maxilliped has a palp of two articles.

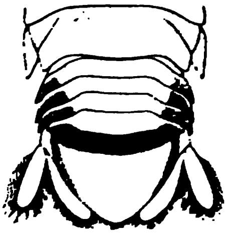

FIG. 188.—ROCINELA BELLICEPS. ABDOMEN AND LAST THORACIC SEGMENT. × 2½.

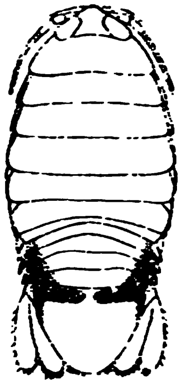

FIG. 189.—ROCINELA BELLICEPS.

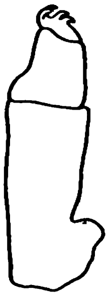

FIG. 190.—ROCINELA BELLICEPS. MAXILLIPED. × 27½.

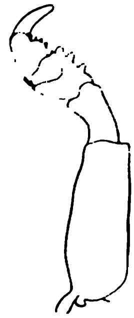

FIG. 191.—ROCINELA BELLICEPS. LEG OF THIRD PAIR. × 7.

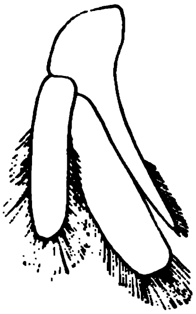

FIG. 192.—ROCINELA BELLICEPS. UROPOD. × 6¼.

The first segment of the thorax is a little longer than any of the others; the second, third, and fourth are subequal; the fifth, sixth, and seventh are progressively shorter, the seventh being only half as long as the sixth. The epimera of all the segments are distinct with the exception of the first. The posterior extremities of the first three are round; those of the last three are acute. A faint carina crosses the epimera obliquely.

The first segment of the abdomen is entirely concealed by the last thoracic segment, so that there is no trace of it whatever on the dorsal side. The lateral parts of the segments are not distinct from the dorsal portion. The last segment is widely rounded posteriorly with margin faintly crenulate. The uropoda are alike in shape, being long and narrow with posterior margins rounded, oar-like; the inner branch is a little longer than the outer branch and does not extend beyond the extremity of the terminal abdominal segment; the branches are equally wide. The basal segment of the uropoda extends as far as the end of the outer branch, and nearly to the end of the inner branch.

The first three pairs of legs are prehensile; the last four pairs ambulatory. There are three spines on the merus and three on the propodus of the first three pairs of legs.

The lateral parts of the second, third, fourth, and fifth segments of the abdomen and the base of the sixth or terminal segment are marked with black.

ROCINELA AMERICANA **Schiœdte and Meinert.**

Rocinela americana Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XII, 1879–1880, pp. 394–395, pl. xii, figs. 16–18.—Harger, Bull. Museum Comp. Zool., Harvard College, XI, 1883, No. 4, pp. 98–99, pl. iv, figs. 3, 3a, 4; pl. iv, figs. 2–2a.—Richardson, American Naturalist, XXXIV, 1900, p. 219; Proc. U. S. Nat. Mus., XXIII, 1901, p. 524.

Localities.—Trenton, Maine; latitude 40° 2′ 54″ north, longitude 70° 23′ 40″ west; latitude 40° north, longitude 70° 57′ west; latitude 39° 57′ north, longitude 70° 57′ 30″ west; latitude 37° 25′ north, longitude 74° 18′ west; latitude 40° 2′ north, longitude 70° 37′ 30″ west.

Depth. — 85–157 fathoms.

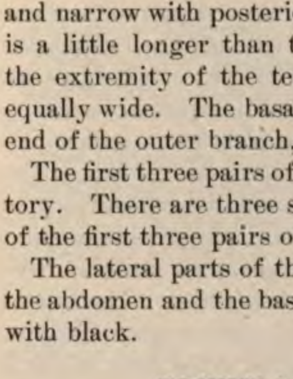

FIG. 193.—ROCINELA AMERICANA (AFTER SCHIŒDTE AND MEINERT). *a*, FRONTAL MARGIN WITH BOTH ANTENNÆ AND FRONTAL LAMINA. *b*, YOUNG FEMALE. (ENLARGED.)

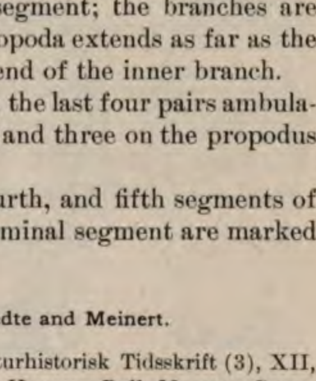

FIG. 194.—ROCINELA AMERICANA. *a*, SECOND LEG. × 11¼. *b*, MAXILLIPED. × 39.

Body ovate, a little more than twice as long as broad, 9 mm. : 20 mm. Head twice as wide as long, 2 mm. : 4 mm.; triangular in shape, with the front produced over the basal articles of the antennæ. Eyes large, oval, composite, separated in front by a distance nearly equal to the width of one eye. Basal article of the first pair of antennæ short and nearly concealed by the front of the head; second article twice as long as the basal article; third article twice as long as the second one. Flagellum is composed of six articles. The first antennæ extend to the end of the peduncle of the second pair of antennæ or to the antero-lateral angle of the first thoracic segment. The first two articles of the second pair of antennæ are short, the second shorter than the first; the third is twice as long as the first; the fourth is equal in length to the third; the fifth is one and a half times longer than the fourth. The flagellum is composed of fourteen to fifteen articles. The second antennæ extend to the posterior margin of the second thoracic segment. The frontal lamina is small, almost inconspicuous, rhomboid-shaped at the base, which is ventrally placed. The maxilliped has a palp of two articles.

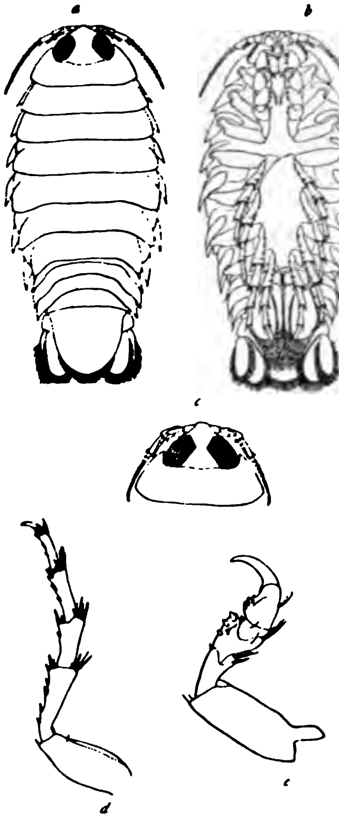

FIG. 195.—ROCINELA AMERICANA (AFTER HARGER). *a*, DORSAL VIEW OF FEMALE. × 2. *b*, VENTRAL VIEW OF FEMALE. × 2. *c*, HEAD AND FIRST THORACIC SEGMENT OF MALE. × 2. *d*, LEG OF SIXTH PAIR. × 6⅔. *e*, LEG OF FIRST PAIR. × 6⅔.

The first segment of the thorax is a little longer than the others. The epimera are distinct from the segments in all but the first segment; they are narrow plates with the posterior extremity very acute in the last four. The epimeron of the seventh segment is produced beyond the posterior margin of the segment. A distinct carina obliquely crosses all the epimera.

The first segment of the abdomen is almost entirely concealed by the seventh thoracic segment. The lateral parts of the abdominal segments are not separated off from the dorsal portion. The sixth or terminal segment is rounded posteriorly. The inner branch of the uropoda is longer than the outer branch and a little wider. It does not extend beyond the extremity of the terminal abdominal segment. The peduncle extends as far as the tip of the outer branch. Both branches are rounded posteriorly. Uropoda and terminal abdominal segment furnished with spines along the margins.

Legs of the first three pairs prehensile; those of the last four pairs ambulatory. There are three spines on the propodus and three on the merus of all three anterior pairs.

ROCINELA PROPODIALIS Richardson.

Rocinela propodialis Richardson, Bull. U. S. Fish Comm., XXIV, 1905, pp. 214–215.

Locality.—Admiralty Inlet, vicinity of Port Townsend.

Depth.—15–26 fathoms.

Body nearly twice as long as wide. Color brown, with small black dots.

Head triangular and produced in front in a broad median process. Eyes large and separated in front by a distance equal to the length of one eye. The first pair of antennæ extend to the posterior margin of the head or to the end of the peduncle of the second pair; the flagellum has four to six joints. The second pair of antennæ reach the posterior margin of the second thoracic segment; the flagellum has sixteen joints.

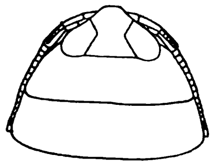

Fig. 196.—Rocinela propodialis. Head with antennæ and first two thoracic segments. × 2½.

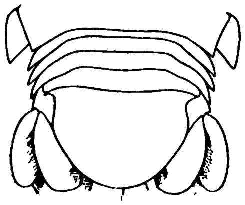

Fig. 197.—Rocinela propodialis. Abdomen. × 2½.

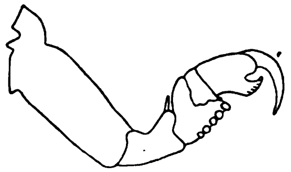

Fig. 198.—Rocinela propodialis. Third leg. × 7.

The several segments of the thorax are about equal in length, the first segment being a little longer and the last a little shorter than the others. The epimera of all the segments are produced at the outer posterior angle, becoming more and more pointed in the last four segments. The epimera of the last segment only project beyond the posterior margin of the segment.

The first segment of the abdomen is entirely concealed by the last thoracic segment. The fifth is narrower than the preceding ones, but longer in the median line. The terminal abdominal segment is linguiform, rounded posteriorly, with smooth margins furnished with short hairs. The uropoda do not exceed in length the terminal abdominal segment. The outer branch is somewhat narrower and shorter than the inner, and both branches are armed with a few short spines along the outer margins and with long hairs along the inner margins.

The first three pairs of legs have the propodus armed with a process, the edge of which is denticulate with six teeth meeting squarely and without interval, forming an unbroken line; the carpus is armed with one inconspicuous spine; the merus has five short blunt spines along the inner margin and the ischium is furnished with one long spine at the outer distal angle. The last four pairs of legs are armed with numerous spines.

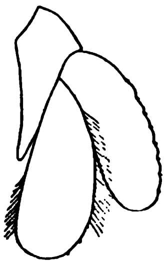

FIG. 199.—ROCINELA PROPODIALIS. UROPOD. × 64.

Only one specimen, a male and the type (Cat. No. 29248 U.S.N.M.), was taken by the U. S. Bureau of Fisheries steamer *Albatross*, at station 4205, Admiralty Inlet, vicinity of Port Townsend.

This species differs from *R. angustata*[a] Richardson, which it closely resembles, in the denticulate process arming the propodus of the first three pairs of legs, with six contiguous teeth meeting squarely along the edge, while in *R. angustata* the propodus is armed with four long spines; in having the merus of these legs armed with five blunt spines instead of four long ones; in having the outer branch of the uropoda a little shorter and narrower than the inner branch instead of almost twice as wide; and in having the frontal process wider and the distance between the eyes in front greater than in *R. angustata.*

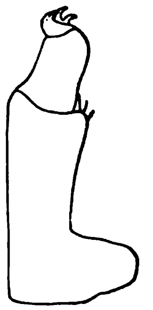

FIG. 200.—ROCINELA PROPODIALIS. MAXILLIPED. × 204.

ROCINELA LATICAUDA Hansen.

Rocinela laticauda HANSEN, Bull. Mus. Comp. Zool., Harvard College, XXXI, 1897, No. 5, pp. 108–109.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 828 (part); Ann. Mag. Nat. Hist. (7), IV, 1899, p. 169 (part).

Localities.—Off Acapulco; near Tres Marias Islands; off Mazatlan.

Body oblong-ovate, two and a half times longer than wide, 16 mm.: 40 mm.

Head wider than long, 4 mm. : 7 mm., triangular in shape, with a median process in front which has a blunt or truncate extremity. The eyes are large, oval, composite, and situated at the sides of the head, and separated anteriorly by a distance equal to 2 mm. The first pair of antennæ have the first two articles short and subequal, the first article being almost entirely concealed dorsally by the frontal process; the third article is twice as long as the second. The flagellum is composed of six articles. The first antennæ extend to the middle of the fifth article of the peduncle of the second pair of antennæ. The second pair of antennæ have the first two articles short and subequal; the third and fourth are also subequal and each is about three times as long

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[a] Proc. U. S. Nat. Mus., XXVII, 1904, p. 33.

as the second; the fifth is one and a half times longer than the fourth. The flagellum is composed of sixteen articles. The second antennæ extend to the middle of the third thoracic segment. The palp of the maxillipeds is composed of two articles.

The segments of the thorax are subequal in length, each being 3 mm. long, with the exception of the first, which is 4 mm. The epimera are distinctly separated on all the segments with the exception of the first. Those of the second and third segments have the posterior extremities rounded; those of the last four segments have the posterior extremities acutely pointed, and the last three are produced beyond the posterior margins of the segments.

The first segment of the abdomen is entirely concealed by the seventh thoracic segment. The remaining five segments are distinct. The sixth or terminal segment is broader than long, 14 mm.: 12 mm. It is 14 mm. wide at the base and also 14 mm. wide about the middle of the segment. The posterior etremity is widely rounded. The uropoda extend to the extremity of the terminal abdominal segment. Both branches are equal in length and are rounded posteriorly. The outer branch is one and a half times as wide as the inner branch. The peduncle of the uropoda has the inner angle produced, and this process extends a little beyond the middle of the terminal segment of the abdomen.

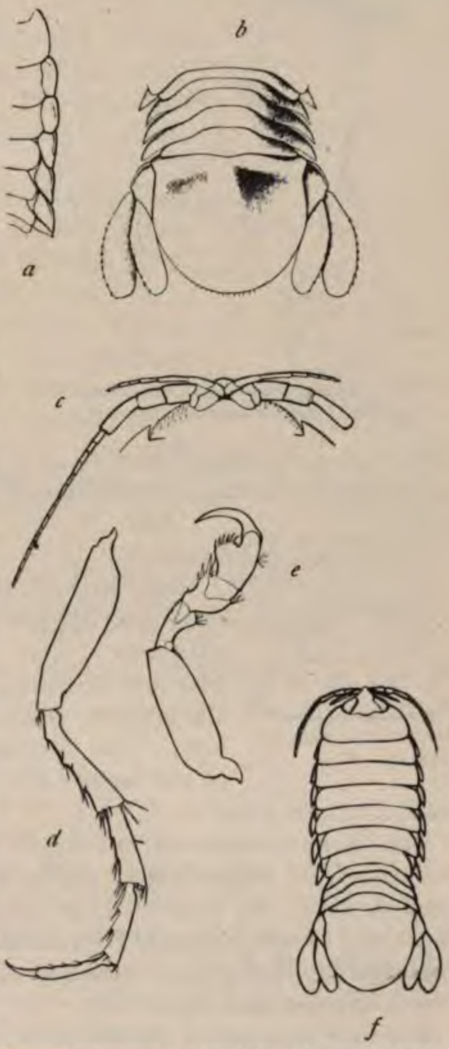

FIG. 201.—ROCINELA LATICAUDA (AFTER HANSEN). *a*, EPIMERA OF SMALL FEMALE. × 3. *b*, ABDOMEN WITH UROPODA OF SAME. × 3. *c*, BOTH PAIRS OF ANTENNÆ OF MALE. × 5. *d*, FIFTH LEG OF LARGE FEMALE. × 4. *e*, SECOND LEG OF SAME. × 4. *f*, GENERAL FIGURE, MALE. × 1.

The first three pairs of legs are prehensile and have the propodus

dus armed with five spines in the larger specimen, six in the smaller specimen, the merus with four spines. The four following pairs of legs are ambulatory and are thickly beset with spines.[a]

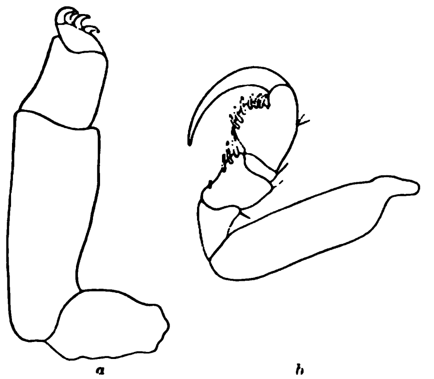

FIG. 202.—ROCINELA LATICAUDA. *a*, MAXILLIPED. × 27½. *b*, LEG OF SECOND PAIR. × 9½.

ROCINELA ANGUSTATA Richardson.

Rocinela laticauda RICHARDSON (not Hansen), Proc. Am. Philos. Soc., XXXVII, 1898, pp. 14–15, figs. 5–6; Proc. U. S. Nat. Mus., XXI, 1899, p. 828 (part); Proc. U. S. Nat. Mus., XXVII, 1904, p. 33; Bull. U. S. Fish Comm., XXIV, 1905, p. 214.

Localities.—Off San Luis Obispo Bay, California; off Esteros Bay, California; Puget Sound, Washington; Unimak Island, Alaska; Japan; Eastern Passage (vicinity of Stikine River Delta), southeastern Alaska; vicinity of Yes Bay, Behm Canal.

Depth.—67–252 fathoms.

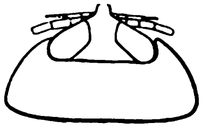

FIG. 203.—ROCINELA ANGUSTATA. HEAD. × 2⅓.

Head, with a median projection, long and broad, extending slightly downward and having a blunt extremity. Eyes large, with ten rows of ocelli. The first antenna, with a flagellum composed of six articles, reaches the posterior margin of the head. The second antenna extends to the middle of the second thoracic segment; its flagellum consists of fifteen articles.

The thoracic segments are equal in length. The first is deeply bisinuated, its antero-lateral angles extending along the side of the head to about the middle of the eyes. The epimera of the second, third, and fourth segments are rounded posteriorly; those of the remaining segments have pointed extremities.

The first segment of the abdomen is almost entirely covered by the last thoracic segment. The fifth segment, as well as this one, is narrower than the intervening segments, and not as broad as the base of the terminal segment. The last segment is 9 mm. wide and 7½ mm. long, widely rounded posteriorly, and is fringed with rough hairs, which almost conceal its crenulated margin; at the base it is impressed

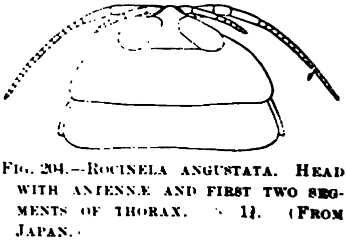

FIG. 204.—ROCINELA ANGUSTATA. HEAD WITH ANTENNÆ AND FIRST TWO SEGMENTS OF THORAX. × 1½. (FROM JAPAN.)

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[a] The measurements are of the larger specimen. The drawings are made from the smaller specimen.

on either side of a keeled center; the outer branch of the uropods is almost twice as broad as the inner branch; they are about equal in length. Both are fringed with hairs and indistinctly crenulate.

The prehensile legs are stout and short. There are four spines on the propodus and six on the merus, besides numerous hairs. The gressorial legs are likewise stout and furnished with spines and hairs.

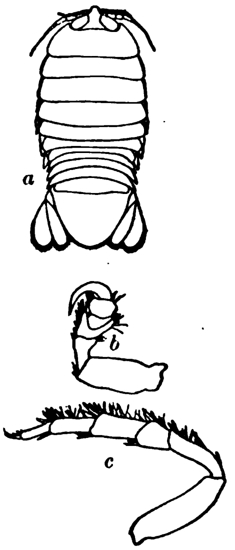

Fig. 206.—Rocinela angustata. *a*, Male, slightly reduced. *b*, Leg of first pair. × 4. *c*, Leg of fourth pair. × 4.

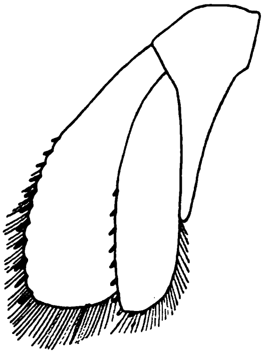

Fig. 205.—Rocinela angustata. Uropod. × 6¼. (From Japan.)

The specimen described came from Alaska, off Unimak Island, station 3225, 85 fathoms (Cat. No. 20088, U.S.N.M.).

Distribution. — One specimen was found off San Luis Obispo Bay, California, station 3195, 252 fathoms; one off Esteros Bay, California, station 3194, 92 fathoms, and another at Puget Sound, Washington, station 3067, 82 fathoms.

The specimens from the coast of California are smaller in size and of very much lighter color than the other specimens. They are similar in other respects.

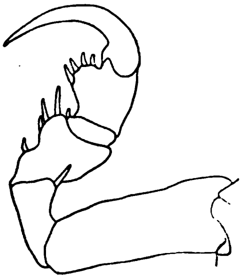

Fig. 207.—Rocinela angustata. Third leg. × 7. (From Japan.)

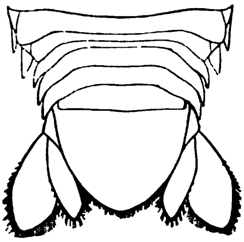

Fig. 208.—Rocinela angustata. Abdomen and last thoracic segment. × 1¾. (From Japan.)

A specimen from Japan, one from Esteros Bay, and one from San Luis Obispo Bay, California, have four spines on the merus of the prehensile legs.

This species differs from *R. modesta* Hansen in the larger eyes, which are also closer together than in that species, the differently shaped head and the wider outer branch of the uropoda.

ROCINELA TUBERCULOSA Richardson.

Rocinela tuberculosa RICHARDSON, Proc. Am. Philos. Soc., XXXVII, 1898, p. 16, fig. 10; Proc. U. S. Nat. Mus., XXI, 1899, p. 828; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 170.

Locality.—Southern part of Gulf of California.

Depth.—8–10 fathoms.

Surface of body punctate and marked with small black dots. The posterior margin of each of the thoracic and abdominal segments is lined with a row of tiny tubercles, above which is a row of small black dots.

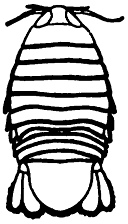

FIG. 209.—ROCINELA TUBERCULOSA. MALE. × 2⅓.

Head subtriangular, rounded in front. Eyes large and situated at a distance of one-third of the head apart. The first antenna, with a flagellum of five articles, reaches the posterior margin of the head; the second antenna extends to the posterior margin of the second thoracic segment; its flagellum is composed of eleven articles.

The posterior margin of all the thoracic segments is edged with a row of small tubercles. The epimera are narrow, those of the second, third and fourth segments being rounded at the tip, while those of the last three segments are more acute.

The first abdominal segment is entirely concealed by the last thoracic segment. The second, third, fourth and fifth segments are likewise edged with a row of small tubercles. The last segment is widely rounded. The outer branch of the uropods is somewhat narrower and shorter than the inner one and is rounded at its extremity. The inner one is bluntly rounded. Both are fringed with hairs, and on their exterior margins are armed with spines. The prehensile legs have three long, stout spines on the merus, one on the carpus, and three on the propodus. The gressorial legs are covered with spines.

Two individuals of this species were found in the southern part of the Gulf of California, at station 2824, eight fathoms, type (Cat. No. 20652, U.S.N.M.), and station 2828, ten fathoms.

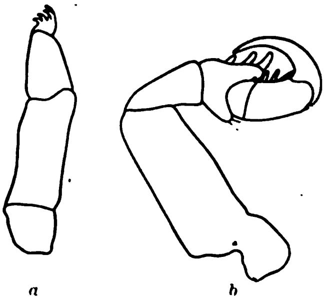

FIG. 210.—ROCINELA TUBERCULOSA. *a*, MAXILLIPED. × 27⅓. *b*, SECOND LEG. × 15⅔.

ROCINELA SIGNATA Schiœdte and Meinert.

Rocinela signata SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XII, 1879–80, pp. 399–401, pl. XIII, figs. 3–6.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 524.—MOORE, Bull. U. S. Fish Comm., XX, Pt. 2, 1902, p. 171, pl. X, fig. 2.

Localities.—West Indies; shores of Central America; St. Croix Island; St. Bartholomew Island; Marco and No Name Key, Florida; between delta of the Mississippi and Cedar Keys, Florida; Key West, Florida; Anclote section; Gulf of Mexico; Culebra, Porto Rico.

Depth.—2–26 fathoms.

Found in coarse sand and coral; in rocks. From back of grouper; off fish *Diplectrum formosum;* in the gills of *Thunnus alatunga;* in gills of a scaroid; on "*Hæmulon* or *Sciæna*" (Schiœdte and Meinert).

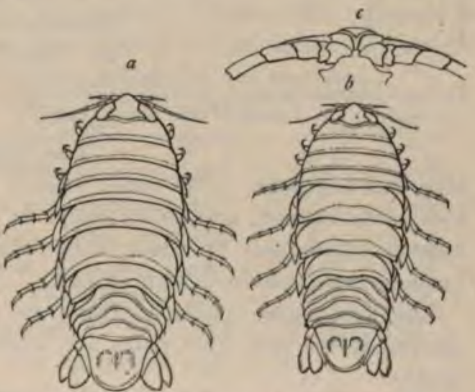

FIG. 211.—ROCINELA SIGNATA (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, YOUNG FEMALE. *c*, FRONTAL MARGIN WITH BOTH ANTENNÆ AND FRONTAL LAMINA. (ENLARGED.)

Body oblong-ovate, a little more than twice as long as wide, 6 mm.:13 mm.

Head twice as wide as long, 2 mm.:4 mm., triangular in shape and produced in front over the basal articles of the antennæ. Eyes large, oval, composite, separated in front by a distance somewhat greater than the width of one eye. The first pair of antennæ have the basal article short, and covered by the front of the head; second article about twice as long as the first; third article about one and a half times as long as the second. The flagellum is composed of four articles. The first pair of antennæ extend to the middle of the fifth article of the peduncle of the second antennæ. The first two articles of the second antennæ are short, the second one being somewhat shorter than the first; the third and fourth are subequal and each is twice as long as the first; the fifth is a little longer than the fourth. The flagellum is composed of twelve articles. The second antennæ extend almost, but not quite, to the posterior margin of the second thoracic segment. The frontal lamina is small, almost inconspicuous, rhomboid-shaped and ventrally placed. The maxilliped has a palp of two articles.

The first, fourth, fifth, and sixth segments of the thorax are a little longer than any of the others. The epimera are distinct from the segments in all but the first. They are narrow plates, with the posterior extremity very acute in the last four. The seventh epimeron is produced beyond the posterior margin of the segment.

The first segment of the abdomen is almost entirely concealed by the seventh thoracic segment. The lateral parts of the segments are not distinct from the dorsal portion. The sixth or terminal segment is rounded posteriorly and furnished with short spines. At the base of the terminal segment is a short median longitudinal black line, with two much shorter lines, one on either side, all connected at the base. On either side of this group of three longitudinal lines, and connected with the lateral lines, is a line which runs obliquely for some distance and then extends in a longitudinal direction for a short distance. The lines are distinctly marked, but very narrow.

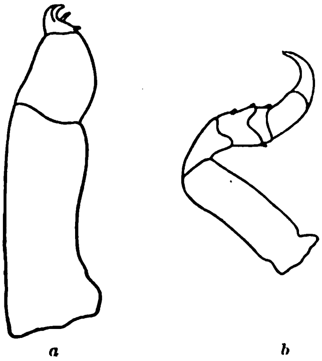

FIG. 212.—ROCINELA SIGNATA. *a*, MAXILLIPED. × 51⅓. *b*, SECOND LEG. × 15⅓.

The uropoda are not longer than the terminal segment. The outer branch is narrower and shorter than the inner branch, and is rounded at its posterior end. The inner branch is obliquely truncate, with rounded post-lateral angles. Both branches are provided with spines.

The first three pairs of legs are prehensile and with propodus unarmed; the last four pairs are ambulatory and armed with a few spines.

ROCINELA ARIES Schiœdte and Meinert.

Rocinela aries SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XII, 1879–80, pp. 401–403, pl. XIII, figs. 7–8.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 828; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 170.

Localities.—Mazatlan; Lower California; Panama Bay; Gulf of California.

Body ovate; twice as long as wide; 10 mm.: 20 mm.

Head twice as wide as long; 2 mm.: 4 mm.; triangulate, with the front produced over the basal articles of the antennæ. Eyes large, oval, composite, separated in front by a distance equal to the length of one eye. Basal article of first antenna short, almost entirely concealed by the front; second article about twice as long as the first; third article one and a half times longer than the second. The flagellum is composed of five articles. The first antennæ extend to the middle of the fifth article of the peduncle of the second antenna or to the antero-lateral angle of the first thoracic segment. The first article of the second antennæ is twice as long as the second article, which is almost inconspicuous; the third article is twice as long as the first;

the fourth is a little longer than the third; the fifth is one and a half times longer than the fourth. The flagellum is composed of twelve articles. The second antennæ extend to the posterior margin of the second thoracic segment. The frontal lamina is small and almost inconspicuous, triangular in shape at the base, which is ventrally placed. The maxilliped has a palp of two articles.

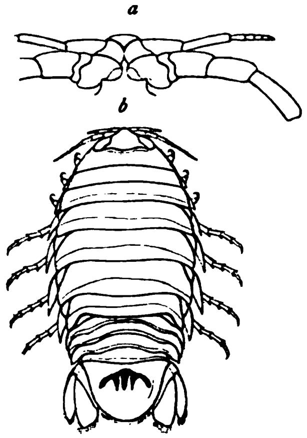

FIG. 213.—ROCINELA ARIES (AFTER SCHIŒDTE AND MEINERT). *a*, FRONTAL MARGIN, ANTENNÆ AND FRONTAL LAMINA. *b*, ADULT FEMALE. (ENLARGED.)

The first, fourth, fifth, and sixth segments of the thorax are a little longer than the others. The epimera are distinct on all the segments but the first. They are narrow plates with the posterior angles increasingly acute. The epimera of the last segment are produced beyond the posterior margin of the segment.

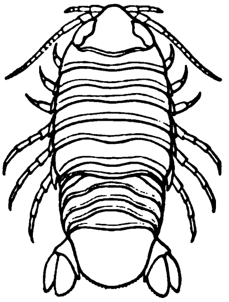

FIG. 214.—ROCINELA ARIES (AFTER SCHIŒDTE AND MEINERT). YOUNG. (ENLARGED.)

The first segment of the abdomen is almost entirely concealed by the last thoracic segment. The lateral parts are not separated from the dorsal portion. The sixth or terminal segment is rounded posteriorly. The base of the terminal segment is marked with three longitudinal black lines, one on either side of a median line, and two oblique lines, one on either side, and all five connected at the base. The outer branch of the uropoda is shorter than the inner branch and half as wide. The inner branch is obliquely truncate, with rounded angles. The outer branch is posteriorly rounded. The peduncle of the uropoda is as long as the outer branch. The margins of the uropoda and the terminal segment are furnished with spines.

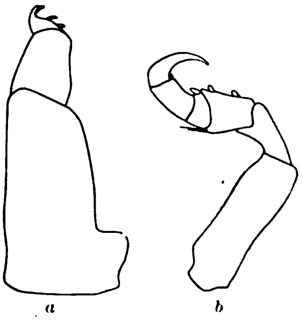

FIG. 215.—ROCINELA ARIES. *a*, MAXILLIPED. × 38½. *b*, LEG OF SECOND PAIR. × 11½.

The first three pairs of legs are prehensile, the last four pairs ambulatory. The merus of all three anterior legs is furnished with two spines, the carpus with one spine, and the propodus of the second and third with one spine. The ambulatory legs are beset with a few spines.[a]

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[a] For description of the young of the first stage, see Schiœdte and Meinert, Nat. Tidsskr. (3), XII, 1879–80, pp. 402–403.

extremity very acute in the last four. The seventh epimeron is produced beyond the posterior margin of the segment.

The first segment of the abdomen is almost entirely concealed by the seventh thoracic segment. The lateral parts of the segments are not distinct from the dorsal portion. The sixth or terminal segment is rounded posteriorly and furnished with short spines. At the base of the terminal segment is a short median longitudinal black line, with two much shorter lines, one on either side, all connected at the base. On either side of this group of three longitudinal lines, and connected with the lateral lines, is a line which runs obliquely for some distance and then extends in a longitudinal direction for a short distance. The lines are distinctly marked, but very narrow.

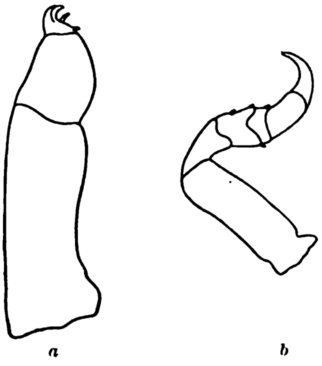

FIG. 212.—ROCINELA SIGNATA. *a*, MAXILLIPED. × 51⅓. *b*, SECOND LEG. × 15⅓.

The uropoda are not longer than the terminal segment. The outer branch is narrower and shorter than the inner branch, and is rounded at its posterior end. The inner branch is obliquely truncate, with rounded post-lateral angles. Both branches are provided with spines.

The first three pairs of legs are prehensile and with propodus unarmed; the last four pairs are ambulatory and armed with a few spines.

ROCINELA ARIES Schiœdte and Meinert.

Rocinela aries SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XII, 1879–80, pp. 401–403, pl. XIII, figs. 7–8.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 828; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 170.

Localities.—Mazatlan; Lower California; Panama Bay; Gulf of California.

Body ovate; twice as long as wide; 10 mm.: 20 mm.

Head twice as wide as long; 2 mm.: 4 mm.; triangulate, with the front produced over the basal articles of the antennæ. Eyes large, oval, composite, separated in front by a distance equal to the length of one eye. Basal article of first antenna short, almost entirely concealed by the front; second article about twice as long as the first; third article one and a half times longer than the second. The flagellum is composed of five articles. The first antennæ extend to the middle of the fifth article of the peduncle of the second antenna or to the antero-lateral angle of the first thoracic segment. The first article of the second antennæ is twice as long as the second article, which is almost inconspicuous; the third article is twice as long as the first;

the fourth is a little longer than the third; the fifth is one and a half times longer than the fourth. The flagellum is composed of twelve articles. The second antennæ extend to the posterior margin of the second thoracic segment. The frontal lamina is small and almost inconspicuous, triangular in shape at the base, which is ventrally placed. The maxilliped has a palp of two articles.

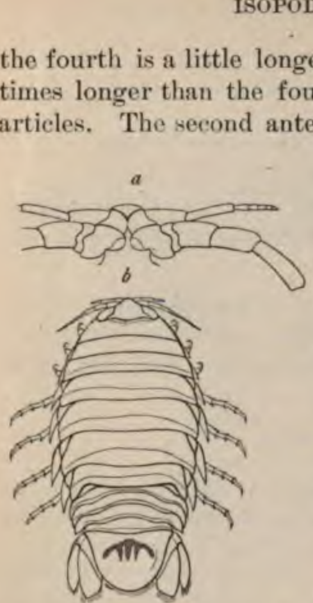

FIG. 213.—ROCINELA ARIES (AFTER SCHIŒDTE AND MEINERT). a, FRONTAL MARGIN, ANTENNÆ AND FRONTAL LAMINA. b, ADULT FEMALE. (ENLARGED.)

The first, fourth, fifth, and sixth segments of the thorax are a little longer than the others. The epimera are distinct on all the segments but the first. They are narrow plates with the posterior angles increasingly acute. The epimera of the last segment are produced beyond the posterior margin of the segment.

The first segment of the abdomen is almost entirely concealed by the last thoracic segment. The lateral parts are not separated from the dorsal portion. The sixth or terminal segment is rounded posteriorly. The base of the terminal segment is marked with three longitudinal black lines, one on either side of a median line, and two oblique lines, one on either side, and all five connected at the base. The outer branch of the uropoda is shorter than the inner branch and half as wide. The inner branch is obliquely truncate, with rounded angles. The outer branch is posteriorly rounded. The peduncle of the uropoda is as long as the outer branch. The margins of the uropoda and the terminal segment are furnished with spines.

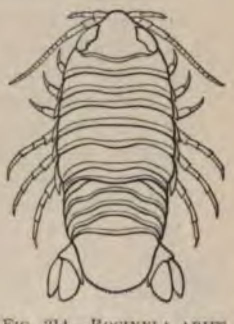

FIG. 214.—ROCINELA ARIES (AFTER SCHIŒDTE AND MEINERT). YOUNG. (ENLARGED.)

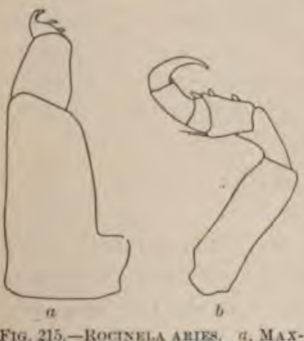

FIG. 215.—ROCINELA ARIES. a, MAXILLIPED. × 38¾. b, LEG OF SECOND PAIR. × 11¼.

The first three pairs of legs are prehensile, the last four pairs ambulatory. The merus of all three anterior legs is furnished with two spines, the carpus with one spine, and the propodus of the second and third with one spine. The ambulatory legs are beset with a few spines.[a]

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[a] For description of the young of the first stage, see Schiœdte and Meinert, Nat. Tidsskr. (3), XII, 1879–80, pp. 402–403.

32. Genus SYSCENUS Harger.

Body depressed. Abdomen abruptly narrower than thorax.

Eyes wanting.

First two articles of the first pair of antennæ not expanded or dilated.

Mandibles without molar expansion. Maxillipeds with the palp composed of two articles.

First three pairs of legs with the propodus not expanded, cylindrical; dactylus abruptly curved in the middle, and terminating in a very sharp point. Four posterior pairs with the propodal joint elongated.

SYSCENUS INFELIX Harger.

Syscenus infelix HARGER, Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 387–390; Bull. Mus. Comp. Zool. Harvard College, XI, 1883, No. 4, pp. 100–102, pl. III, figs. 5–5a; pl. IV, figs. 3–3h.

Harponyx pranizoides SARS, Forhandlungen i Videnskab Selsk. Christiania, No. 18, 1883 (young).

Rocinela lilljeborgii BOVALLIUS, Bihang. till Vetensk. Akad. Handl., X, No. 10, 1885, pp. 3–10, pls. I–II.

Syscenus lilljeborgii BOVALLIUS, Bihang. till K. Sv. Vet. Akad. Handl., XI, No. 17, 1886–87, pp. 17–18.

Syscenus infelix RICHARDSON, Proc. Amer. Philos. Soc., XXXVII, 1898, p. 8 (footnote[1]); American Naturalist, XXXIV, 1900, p. 219; Proc. U. S. Nat. Mus., XXIII, 1901, p. 524.—NORMAN, Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 437.

Localities.—Latitude 41° 34′ 30″ north, longitude 65° 54′ 30″ west; latitude 40° 11′ 40″ north, longitude 68° 22′ west; Marthas Vineyard; south of Long Island; off Nantucket Shoals; all along the Atlantic coast as far south as Delaware Bay; west coast of Norway at Hoitingsö and Bekkervig (Sars); coast of Bohuslän (Bovallius); British Isles (Norman).

Depth.—80–640 fathoms; 516 fathoms (Norman).

Body elongate, nearly three times as long as broad, 10 mm.: 28 mm.

Head three times as wide as long, 2 mm.: 6 mm., triangular in shape, with frontal margin somewhat three-lobed, the median lobe being anterior to the other two and acutely produced between the basal articles of the antennæ, but not meeting the frontal lamina on the other side. The eyes are absent. The first pair of antennæ have the three articles of the peduncle of equal length and all conspicuous. The

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[1] In the Proc. U. S. Nat. Mus., XXVII, 1904, pp. 6 and 9, I refer to the genus *Harponyx* as a separate genus. Doctor Hansen, in a letter, called my attention to this error, saying that Sars had suppressed the genus, a fact which I had temporarily overlooked.

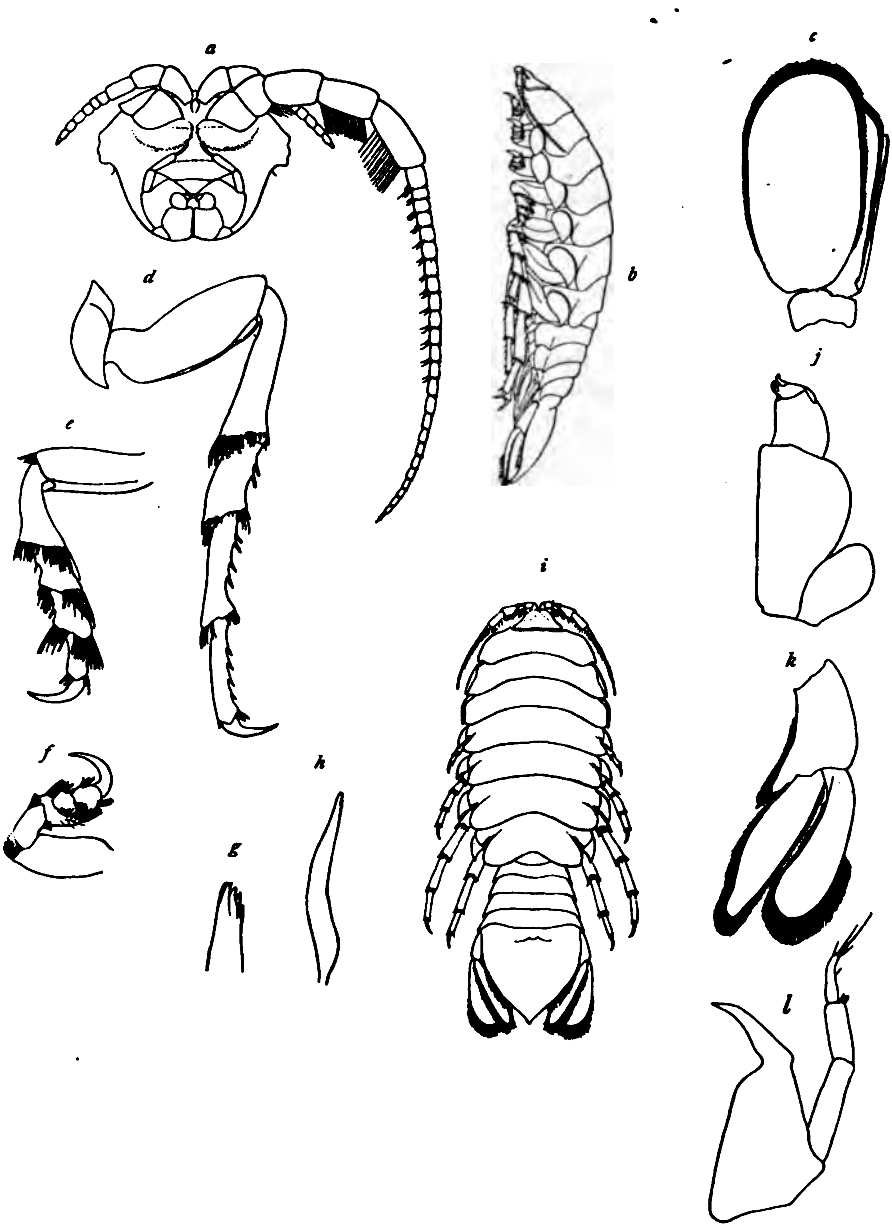

Fig. 216.—Syscenus infelix (After Harger). *a*, Inferior view of head. × 8. *b*, Lateral view of male. × 1½. *c*, Second pleopod of male. × 4. *d*, Leg of sixth pair. × 4. *e*, Leg of fourth pair. × 4. *f*, Leg of first pair. × 4. *g*, Tip of first maxilla. × 75. *h*, First maxilla. × 20. *i*, Dorsal view of male. × 1½. *j*, Left maxilliped. × 20. *k*, Uropod of male. × 4. *l*, Left mandible. × 20.

flagellum is composed of seven articles. The first antennæ extend to the end of the peduncle of the second pair of antennæ or to the posterior margin of the head. The second pair of antennæ have the first two articles equal in length; the third and fourth are also subequal, and each is about twice as long as the second; the fifth is one and a half times longer than the fourth. The flagellum is composed of twenty-five articles. The second antennæ extend to the posterior margin of the third thoracic segment. The frontal lamina is large, conspicuous, rhomboid shaped, and ventrally placed. The maxilliped has a palp of two articles.

The first segment of the thorax is longer than any of the others. The epimera are distinct from the segments with the exception of the first. They are broad plates with the posterior extremities very acute. The post-lateral angles of the first thoracic segment are also acute.

The abdomen is abruptly very much narrower than the thorax. All six segments are distinct. The lateral parts are not separated off from the dorsal portion. The terminal segment is large and triangular in shape, with the posterior extremity acutely produced. The uropoda are as long as the terminal segment of the abdomen. The outer branch is wider but shorter than the inner branch; it is more broadly rounded posteriorly than the inner branch. The peduncle of the uropoda is not produced at the inner angle.

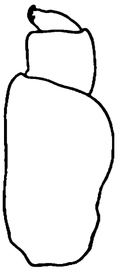
FIG. 237.—SYSCENUS INFELIX. MAXILLIPED. × 27.

The first three pairs of legs are prehensile, the last four pairs ambulatory. The first three pairs are not furnished with spines. The fifth pair of legs is a little longer than the fourth pair. The sixth and seventh pairs are equal in length and extremely long, being very much longer than the fourth and fifth pairs.

Family IX. CYMOTHOIDÆ.

Antennæ strongly reduced and without clear distinction between peduncle and flagellum. All seven pairs of legs prehensile, terminating in strong hooked fingers. Pleopods not ciliated. Terminal segment and uropoda usually not ciliated.

Maxillipeds with palp composed of two articles; terminal article furnished with hooks.

Mandibles with palps.

First maxillæ with masticatory lobe composed of a single tapering article furnished with four spines at tip.

Second maxillæ bilobed at tip and furnished with numerous spines.

Epimera distinct on all the segments with the exception of the first.

Parasitic forms.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY CYMOTHOIDÆ.

a. Head posteriorly produced in three lobes, a larger median lobe and two small lateral lobes; not at all immersed in first thoracic segment. Anterior margin of first thoracic segment distinctly trisinuate.

b. Uropoda and terminal segment ciliated. Eyes large, conspicuous. Genus *Ægathoa* Dana

b′. Uropoda and terminal segment not ciliated. Eyes small.

c. Posterior angles of first segment of body prominent or produced, very often acute; posterior angles of the following segments increasing gradually in length, the first of these very often scarcely produced, the posterior ones very often produced, abruptly longer than the first. Epimera of the first segments extending beyond the posterior angles of the segment; posterior ones produced, acute..............................Genus *Nerocila* Leach

c′. Posterior angles of first six segments of body scarcely or not at all prominent, those of seventh segment produced. Epimera of first segments very often almost reaching, or not reaching by a short distance, the posterior angle of the segment.

d. Body compact. Head not constricted at the base. Uropoda very often more or less longer than terminal segment. Legs gradually increasing in length......................................Genus *Anilocra* Leach

d′. Body relaxed. Head constricted at the base. Uropoda much shorter than terminal segment. Legs gradually much longer successively; seventh pair abruptly very much longer..................Genus *Olencira* Leach

a′. Head not produced posteriorly in three lobes; more or less immersed in first thoracic segment. Anterior margin of first thoracic segment not trisinuate.

b. Antennæ very much dilated; those of the first pair contiguous at base.

c. Epimera of the first pair with a carina produced in the form of a spoon in female. Ungulæ very long, unequal in length; those of the third pair longest, abruptly longer than second pair. Terminal segment transverse..Genus *Ceratothoa* Dana

c′. Epimera of the first pair not produced in female. Ungulæ mostly very short, very rarely long, equal in length. Terminal segment subtriangular, semicircular, often bilobed........................Genus *Meinertia* Stebbing

b′. Antennæ not dilated, but compressed.

c. Antennæ of the first pair almost contiguous at base.

d. Body hunched or compressed; the posterior segments of the body on one side flattened, dilated..............Genus *Agarna* Schiœdte and Meinert

d′. Body evenly convex, not hunched; posterior segments of the body rather convex..........................Genus *Indusa* Schiœdte and Meinert

c′. First pair of antennæ widely separated at the base.

d. Abdomen manifestly separated from the thorax, abruptly narrower than thorax...................................Genus *Cymothoa* Fabricius

d′. Abdomen continuous with thorax, not narrower than thorax.

e. Abdomen very little or scarcely immersed. Segments of thorax either equal in length or the first segment abruptly longer and the last segment abruptly shorter than the others..............Genus *Livoneca* Leach

e′. Abdomen very deeply and profoundly immersed. First segment of the thorax manifestly longer than the second; six posterior segments gradually decreasing a little in length...Genus *Irona* Schiœdte and Meinert

33. Genus ÆGATHOA[a] Dana.

Eyes large, oval, composite. Posterior margin of head produced in three lobes.

Anterior margin of first thoracic segment manifestly trisinuate. Post-lateral angles of thoracic segments not produced. Epimera distinct on all the segments of the thorax with the exception of the first; they extend the full length of the segments and are not acutely produced posteriorly.

The abdomen is not narrower than the thorax, but continues the oval outline of the body. The abdominal segments are not shorter than the last thoracic segments. Pleopods not ciliated. Uropoda and terminal segment of abdomen furnished with hairs.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ÆGATHOA.

a. Frontal margin of head produced anteriorly in a median lingulate projection. *Ægathoa linguifrons* Richardson
a'. Frontal margin of head not produced anteriorly in a median lingulate projection.
  b. Surface of head smooth, evenly convex. Second pair of antennæ composed of ten articles. First thoracic segment longer than any of the succeeding segments, which are of equal length ....*Ægathoa oculata* (Say)
  b'. Surface of head with central portion sharply raised above the lateral portion, which is deeply excavate just in front of the eyes. Second pair of antennæ composed of eight articles. First three thoracic segments of equal length; last four subequal and somewhat shorter than first three. *Ægathoa medialis* Richardson

ÆGATHOA LINGUIFRONS Richardson.

Ægathoa linguifrons RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 526.

Locality. Trinidad.

Body narrow, elongate; abdomen not narrower than thorax.

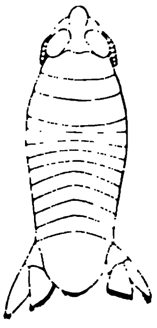

FIG. 218.—ÆGATHOA LINGUIFRONS.

Head with sides rounded. Frontal margin abruptly produced anteriorly into a median lingulate projection, with apex rounded; posterior part of projection forming a raised surface sharply defined on anterior part of head, extending back to eyes. Eyes large, oval, occupying two-thirds the width of head. First pair of antennæ nine-jointed. Second pair more slender equal in length to first pair and ten-jointed.

First three thoracic segments long, second one shortest; last four segments short, of nearly equal length. All the abdominal segments distinct; first five equal in length, terminal segment rounded at apex. Uropoda longer than terminal segment. Inner branch obliquely truncate at apex and shorter than outer branch, which is obtusely pointed.

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[a] This genus, perhaps, represents the young of *Livoneca*. The figure given by Schiødte and Meinert of the young female of *Livoneca redmanni* does not apparently differ from *Ægathoa oculata* (Say). I have not suppressed the genus, however, because I could not be positive of the identity of these forms.

Both branches, as well as the posterior margin of the terminal segment, are fringed with hairs.

Legs similar in structure, with curved dactyli.

Color, light brown, with scattered black dots.

A single specimen was obtained at Trinidad.

Type.—Cat. No. 23903, U.S.N.M.

ÆGATHOA OCULATA[a] (Say).

Cymothoa oculata Say, Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 398–399.

Ægathoa loliginea Harger, Am. Jour. Sci. (3), XV, 1878, p. 376; Proc. U. S. Nat. Mus., II, 1879, p. 161; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 393–394, pl. x, fig. 66.—Richardson, American Naturalist, XXXIV, 1900, p. 220; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 526–527.

Localities.—Savin Rock, near New Haven, Connecticut; Fort Macon, North Carolina; St. Johns River, Florida (Say); Cristield, Maryland; Cozumel; St. Thomas, West Indies.

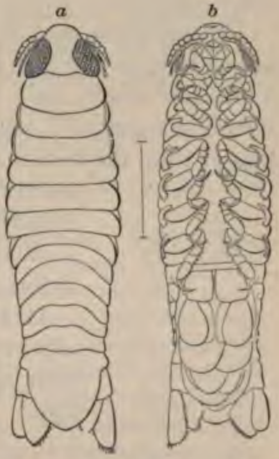

Fig. 219.—Ægathoa oculata (after Harger). *a*, Dorsal view. × 4. *b*, Ventral view. × 4.

Parasite of squid (*Loligo pealii*); young mullet.

Say's type of this species, placed in the Academy of Natural Sciences of Philadelphia, is undoubtedly identical with Harger's *Ægathoa loliginea*. The earlier name must, therefore, be accepted for this species.

As the type specimen is dry and not perfectly preserved, the following description is from an alcoholic specimen:

Body elongate, nearly four times longer than wide, 3 mm.: 11 mm.

Head as wide as long, 2 mm.: 2 mm., slightly narrower anteriorly than posteriorly, with the anterior margin widely rounded. The posterior margin of the head is produced in three equal lobes. The eyes are large, oval, composite, and situated in the post-lateral angles of the head, but extend along the sides of the head almost to the antero-lateral angles. The first pair of antennæ are composed of eight articles, and extend to the posterior margin of the head. The second pair of antennæ are composed of nine articles, and extend to the middle of the first thoracic segment. The basal articles of the first pair of antennæ are not adjacent, but are sep-

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[a] See Harger for more detailed description, Report U. S. Commission of Fish and Fisheries, Pt. 6, 1880, pp. 393–394.

NEROCILA ACUMINATA Schiœdte and Meinert.

Nerocila acuminata SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XIII, 1881-1883, pp. 48-50, pl. III, figs. 5-6.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 220; Proc. U. S. Nat. Mus., XXIII, 1901, p. 527; Trans. Conn. Acad. Sci., XI, 1902, p. 291.

Localities.—Atlantic Ocean and Gulf of Mexico; St. Anna, Mexico; Louisiana; Pensacola and St. Marys River, Florida; Fort Macon, North Carolina; Newpoint, Virginia; Biloxi, Mississippi; Bermudas; Lake Harley, Florida; south Florida.

Parasites of the saw-fish; *Chætodipterus faber* (side of body); *Spheroides maculatus; Alutera schœpfii; Lachnolaimus maximus* (on fin).

Body ovate, a little more than one and a half times longer than wide, 13 mm.: 21 mm.

Head, somewhat quadrate, as long as wide, 4 mm.: 4 mm., with the anterior margin almost straight, slightly rounded, and the posterior margin produced in three lobes, the middle one being much the larger. Eyes absent. The first pair of antennæ are composed of eight articles and extend to the post-lateral lobe of the head. The second pair of antennæ are composed of nine articles and extend just a little beyond the first pair of antennæ. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

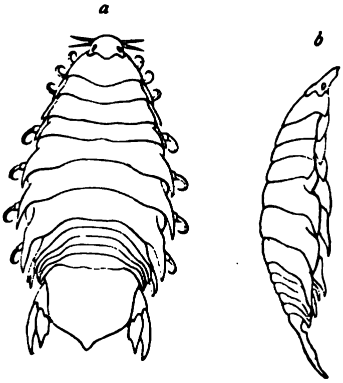

FIG. 222.—NEROCILA ACUMINATA (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, LATERAL VIEW. (ENLARGED.)

The first segment of the thorax is longer than any of the three following segments; the fifth, sixth, and seventh segments are longer than any of the three preceding segments, but gradually decrease in length, the fifth being the longest. The body is broadest at the fifth and sixth segments. The post-lateral angles of all the segments are produced backward in long acute processes, increasing in length from the first to the seventh segment. The epimera are distinctly separated from the segments, with the exception of the first. They are long, narrow plates, becoming more acutely pointed at their posterior extremities from the first to the seventh. The epimera of the second segment extend beyond the post-lateral angles of the segment; those of the third segment extend to the post-lateral angles of the segment; all the others reach the posterior margins of the segments, but do not extend to the extremity of the post-lateral angles.

The segments of the abdomen are all distinct. The sixth or terminal segment is a little broader than long, 6 mm.: 5 mm., almost quadrate, with the post-lateral angles rounded and a small triangular point in the middle of the posterior margin. The uropoda are longer than the terminal abdominal segment. Both branches are produced to long, narrow, acute extremities, the outer branch being slightly narrower at the base and somewhat longer than the inner branch. The inner branch is 3 mm. long; the outer branch 4 mm. in length.

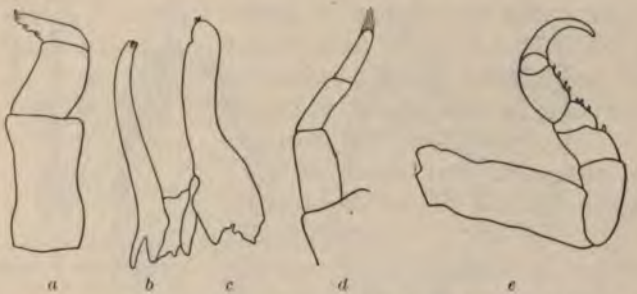

FIG. 223.—NEROCILA ACUMINATA. *a*, MAXILLIPED. × 27½. *b*, FIRST MAXILLA. × 27½. *c*, SECOND MAXILLA. × 27½. *d*, PALP OF MANDIBLE. × 27½. *e*, SEVENTH LEG. × 9⅔.

The legs are all prehensile, slightly increasing in length, with long, curved dactyli.

There are two longitudinal bands or stripes of a light-brown or yellow color extending the entire length of the body, one on either side of the median line. The other parts of the body are dark greenish brown.

NEROCILA CALIFORNICA Schiœdte and Meinert.

Nerocila californica SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XIII, 1881–83, pp. 72–76, pl. V, figs. 12–13; pl. VI, figs. 1–2.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 830; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 172; American Naturalist, XXXIV, 1900, p. 220.

Localities.—San Diego, California; Taboga Island, Panama Bay; off Point Sur, California; National City, California.

Parasites of *Promicrops guttatus;* cat-fish on fin; *Gyropleurodus francisci* on dorsal fin; on dorsal and caudal fin of *Paralabrax clathrata*, *Scorpæna guttata*, *Triakis semifasciata*, *Myliobatis* sp.

Body oblong-ovate, nearly two and a half times longer than wide, 8 mm. :19 mm.

Head, wider than long, 2½ mm.: 3½ mm., with the anterior margin widely rounded, the posterior margin produced in three lobes, the middle one of which is much the larger. The eyes are indistinct and have almost entirely disappeared. They have degenerated, probably owing to the parasitic mode of life, and are certainly functionless. The first pair of antennæ are composed of eight articles and extend to the end of the seventh article of the second pair of antennæ. The second pair of antennæ are composed of ten articles, and extend to the middle of the first thoracic segment. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

The first segment of the thorax is a little longer than any of the three following segments; the last three segments are longer than any of the three preceding segments and are about equal in length to the first segment. The thorax is broadest at the sixth segment. The post-lateral angles of only the last two segments are produced, those of the sixth segment being very little produced, and those of the seventh segment not much produced. The epimera of all the segments, with the exception of the first, are distinctly separated from the segments. The first three have the posterior extremities rounded; the extremities of the last three are more acutely pointed. The epimera do not extend beyond the posterior margins of the segments (and they extend to the posterior margin) except in the last segment, where they almost reach the extremity of the post-lateral angles.

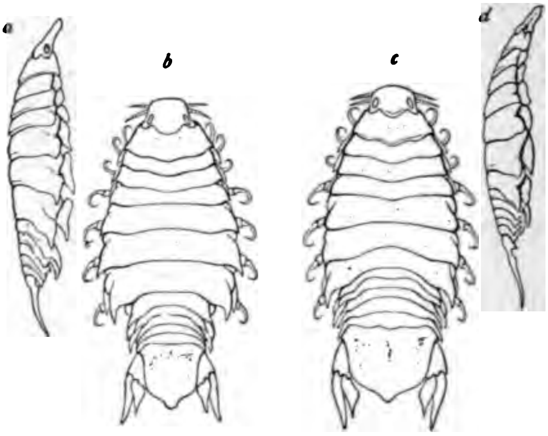

FIG. 224.—NEROCILA CALIFORNICA (AFTER SCHIŒDTE AND MEINERT). *a*, LATERAL VIEW. *b*, ADULT FEMALE. *c*, YOUNG FEMALE. *d*, LATERAL VIEW (ENLARGED.)

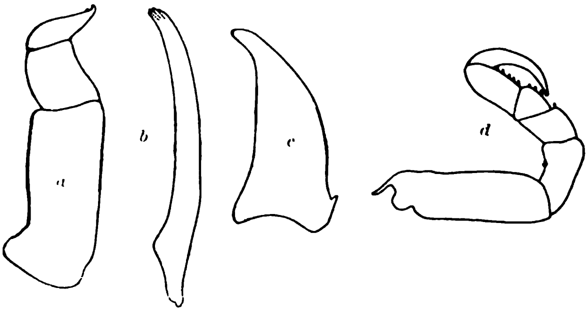

FIG. 225.—NEROCILA CALIFORNICA. *a*, MAXILLIPED. × 27½. *b*, FIRST MAXILLA. × 27½. *c*, MANDIBLE. × 51½. *d*, SEVENTH LEG. × 9½.

All of the segments of the abdomen are distinct. The sixth or terminal segment is about as broad as long, 4 mm.: 4 mm. The segment is somewhat quadrate, with the post-lateral angles obtusely rounded, and the posterior margin produced in a small, triangular median point. The uropoda are longer than the terminal abdominal segment. The outer branch is longer than the inner branch, 3 mm.: 4 mm. Both branches are produced to narrow, acute extremities, the outer branch being also somewhat narrower at the base than the inner branch.

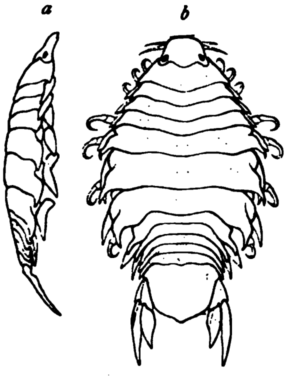

FIG. 226.—NEROCILA CALIFORNICA (AFTER SCHIŒDTE AND MEINERT). *a*, LATERAL VIEW. *b*, ADULT FEMALE. (ENLARGED.)

All the legs are prehensile, gradually increasing in length, and terminate in long, curved dactyli.

There are two longitudinal bands or stripes of a yellow or light-brown color, extending the entire length of the body, one on either side of the median line. The other parts of the body are a dark greenish brown color.

NEROCILA MUNDA Harger.

Nerocila munda HARGER, with VERRILL, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 571 (277); p. 459 (165), 571.—HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 161; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 392–393, pl. x, fig. 65.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 220; Proc. U. S. Nat. Mus., XXIII, 1901, p. 528.

Locality.—Vineyard Sound, at Woods Hole.

Found on dorsal fin of *Alutera schoepfii.*

Body oblong-ovate, a little more than twice as long as wide, 6 mm.: 13 mm.

Head large, sub-quadrate, about as wide as long, 2 mm.: 2 mm., with the posterior margin tri-lobate, the median lobe being the largest. The anterior margin is somewhat triangulate, with apex obtusely rounded. The eyes are small, round, composite, and situated in the post-lateral angles of the head. The first pair of antennæ are composed of eight articles and extend to the middle of the first thoracic segment. The second pair of antennæ are composed of twelve articles and extend one or two articles beyond the first antennæ; the last four articles are very slender and gradually diminish in size and length. The maxilliped has a palp of two articles. The palp of the mandibles is composed of three articles.

The thorax is broadest at the fifth and sixth segments. The first and fifth segments are longer than any of the others. The post-lateral angles of the last three segments are acutely produced, and extend beyond the epimera. The epimera are distinct on all the segments with the exception of the first. The first three are small and the first two have the posterior margins rounded. The last four are acutely produced, the epimera extending to the posterior margins of the segments, but not to the extremity of the postlateral angles in the last three segments.

All the segments of the abdomen are distinct. The sixth or terminal segment is rounded posteriorly. The inner branch of the uropoda is broad with the extremity obliquely truncate; it extends a little beyond the tip of the terminal abdominal segment. The outer branch is one-fourth longer than the inner branch, is slightly narrower, and is produced to a narrow rounded extremity.

All the legs are prehensile, with long, curved dactyli.

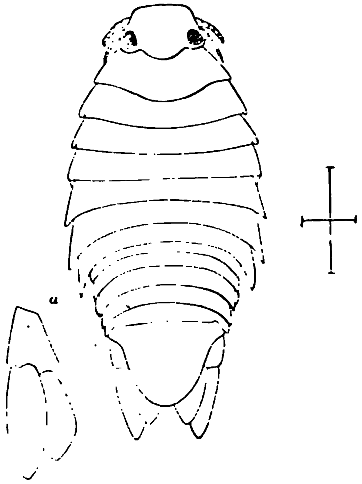

FIG. 227.—NEROCILA MUNDA (AFTER HARGER). × 4. a. UROPOD. × 6.

There are two light longitudinal stripes or bands extending the entire length of the body, one on either side of the median line.

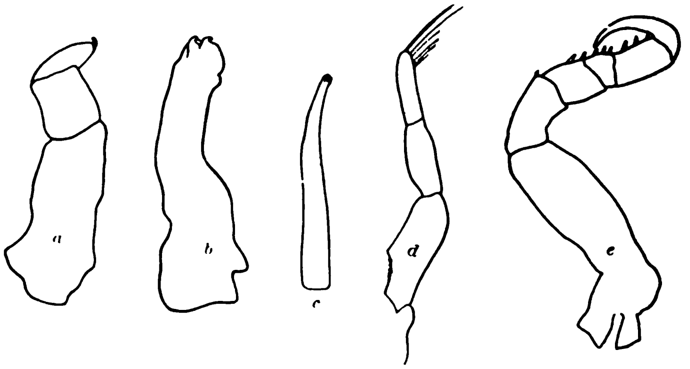

FIG. 228.—NEROCILA MUNDA. a, MAXILLIPED. × 51½. b, SECOND MAXILLA. × 51½. c, FIRST MAXILLA. × 51½. d, PALP OF MANDIBLE. × 51½. e, SEVENTH LEG. 15½.

NEROCILA LANCEOLATA (Say).

Cymothoa lanceolata SAY, Jour. Acad. Nat. Sci. Phila., I., 1818, pp. 397–398.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 221; Proc. U. S. Nat. Mus., XXIII, 1901, p. 530.

Locality.—Cumberland Island, Georgia.

Having seen Say's type specimen of *Cymothoa lanceolata* which is in the Academy of Natural Sciences of Philadelphia, I find that it should be referred to the genus *Nerocila*.

Body oblong-ovate, nearly twice as long as wide, 10 mm.: 19 mm. Head a little wider than long, 3 mm.: 4 mm., with the anterior margin rounded truncate and the posterior margin produced in three lobes, the middle lobe being deeper than and about twice as wide as the lateral lobes. The eyes are entirely absent; no traces of them are to be seen. The first pair of antennæ are composed of eight articles and extend to the middle of the first thoracic segment; they are separated at the base by a distance of 1 mm. The second pair of antennæ are composed of nine articles and extend only a little beyond the end of the first pair of antennæ.

The first thoracic segment is 2 mm. long, about twice as long as any of the three following segments, which are each 1 mm. long in the middle of the dorsal surface. The fifth segment is 1½ mm. in length. The sixth segment is as long as the first—about 2 mm. in length. The seventh segment is 1 mm. long—only half as long as the preceding segment. The post-lateral angles of the first four segments are but little produced. The post-lateral angles of the last two segments are very much produced, those of the seventh segment being more produced than those of the preceding segment. The epimera of the second, third, fourth, and fifth segments extend to the post-lateral angles of their respective segments. Those of the second and third segments are rounded posteriorly. Those of the fourth and fifth segments are obtusely pointed. The epimera of the sixth and seventh segments are very acutely produced and extend to the posterior margins of their respective segments, but not to the post-lateral angles. The first five segments of the abdomen are subequal and all visible in a dorsal view, the first segment not being covered by the last thoracic segment. The first two have the lateral parts produced in long acute processes on the underside, these processes not being visible from a dorsal view. The lateral parts of the other segments are not produced. The sixth or terminal segment is as wide as long—5 mm.: 5 mm.—and is longer than all the five anterior segments taken together—5 mm.: 4 mm. It is triangular in shape, with apex produced and rounded. The uropoda are shorter than the last abdominal segment, the inner branch being the shorter.[a]

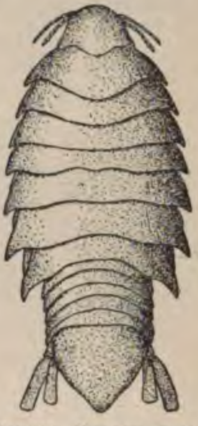

FIG. 229.—NEROCILA LANCEOLATA. × 3.

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[a] The inner branch is probably broken in the specimen, for this branch is described by Say as triangular, whereas it appears truncate in the specimen.

The outer branch is a little narrower than the inner branch and rounded truncate.[a]

38. Genus ANILOCRA Leach.[b]

Body compact, rather stout. Head posteriorly produced in three lobes, not at all immersed and not constricted at the base.

Anterior margin of the first thoracic segment more or less distinctly trisinuate. Posterior angles of the first thoracic segment most always somewhat produced and prominent; those of the second, third, fourth, fifth, and sixth segments not prominent; those of the seventh segment prominent and produced. Anterior epimera almost reach or do not reach by a very short distance the posterior angle of the segment; the posterior epimera do not reach by a greater or less distance the posterior angle of the segment.

Abdomen covered at the base. Legs increase gradually in length, the last pair very often abruptly longer than the others.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ANILOCRA.

a. Head produced, with sides sinuate and roundly truncate in front. Terminal abdominal segment varying in width, either equally as long as wide or manifestly longer than wide. Uropoda much shorter than caudal segment; inner branch scarcely much longer and much wider than outer branch.
Anilocra laticauda Milne Edwards

a′. Head rounded as a circle in front. Terminal abdominal segment wider than long. Uropoda manifestly longer than terminal segment; inner branch much shorter and scarcely wider than outer branch.
Anilocra plebeia Schiœdte and Meinert

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[a] The above description is from a dried specimen, the type, in the collection of the Philadelphia Academy. Say's description is as follows:

Body oblong-oval; head broader than long; tail dilated, lanceolate, carinate, equal to the six preceding segments conjunctly.

Inhabits—

Cabinet of the Academy.

Body, the transverse less than half of the longitudinal diameter; segments narrower before and rounded, acute behind; edge not thickened; *antennæ* not robust; *abdomen*, segments suddenly narrower than the thoracic segments, subequal, the posterior ones gradually narrower; *terminal segment* dilated, lanceolate, a transverse impressed line at base, longitudinally carinated, carina obsolete toward the base, inner terminal joint of the lateral appendices triangular, outer one linear somewhat obliquely truncated at tip.

Length, three-fourths of an inch. Found cast on the beach of Cumberland Island, Georgia.—Say, Journ. Acad. Nat. Sci. Phila., I, 1818, pp. 397–398.

[b] See Schiœdte and Meinert for characters of genus, Nat. Tidsskr. (3), XIII, 1881–83, pp. 100–101.

ANILOCRA LATICAUDA Milne Edwards.

Anilocra laticauda Milne Edwards, Hist. Nat. Crust., III, 1840, p. 259.

Anilocra mexicana Saussure, Rev. Mag. Zool., 1857, p. 505.

Anilocra leachii (Krøyer) Schiœdte, Natur. Tidsskrift (3), IV, 1866, p. 205, pl. XI, figs. 2a–2g.

Anilocra laticauda Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XIII, 1881–83, pp. 126–131, pl. IX, figs. 1–3.—Richardson, American Naturalist, XXXIV, 1900, p. 221; Proc. U. S. Nat. Mus., XXIII, 1901, p. 528.—Moore, Report U. S. Commissioner of Fish and Fisheries, XX, Pt. 2, 1902, p. 172, pl. X, figs. 3–4.

Localities.—From Maryland to the Straits of Magellan; Maryland; Key West; St. Anna, Mexico; Cozumel, Yucatan; Habana, Cuba; St. Thomas; St. Croix; St. Bartolomew; Rio de Janeiro, Brazil; Sandy Point, in Straits of Magellan; Porlamar, Margarita Island, Venezuela; Arroyo and Vieques, Porto Rico.

Parasite of *Hæmulon plumieri;* also of *Upeneus martinicus.*

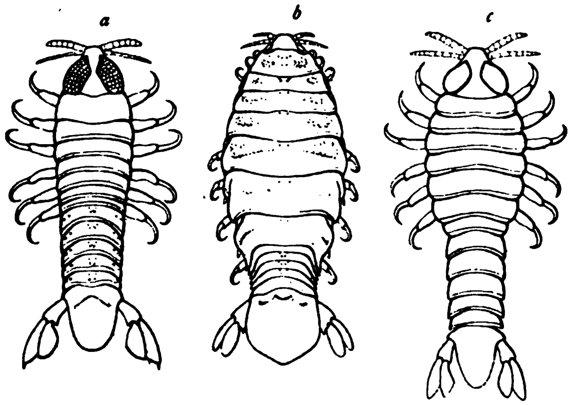

Fig. 230.—Anilocra laticauda (after Schiœdte and Meinert). *a*, Young of the second stage. *b*, Adult female. *c*, Young of the first stage. (All enlarged.)

Body oblong-ovate, nearly two and a half times longer than wide, 14 mm.: 34 mm. Body widest at the fifth thoracic segment.

Head wider at the base than long, 3 mm.: 5 mm., somewhat triangular in shape, becoming gradually narrower toward the anterior extremity, which is produced to a narrow, pointed apex, bending downward over the antennæ, separating the basal articles, and extending on the ventral side to the mouth parts. From a dorsal view the anterior margin is 2 mm. wide and is truncate. The eyes are large, oval, twice as long as wide, composite, and situated in the post-lateral angles of the head. The head is not at all set in the first thoracic segment. The first pair of antennæ are composed of eight articles, and extend to the end of the fifth article of the second pair of antennæ. The basal articles are not contiguous, but are separated by a distance of ½ mm., the width of the frontal process at this point. The second pair of antennæ are composed of ten articles and extend beyond the middle of the first thoracic segment. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

The first and fourth segments of the thorax are subequal and each is 3 mm. in length; the second and third are subequal and each is 2 mm. long; the fifth and sixth are each 4 mm. in length; the seventh is 2½ mm. long. The epimera are distinctly separated on the last six segments. Those of the second and third segments extend the full length of the lateral margin; those of the fourth and seventh segments extend one-half of the lateral margin; those of the fifth and sixth extend one-third of the lateral margin. The first two are rounded posteriorly; the last four have the outer post-lateral angles acutely produced.

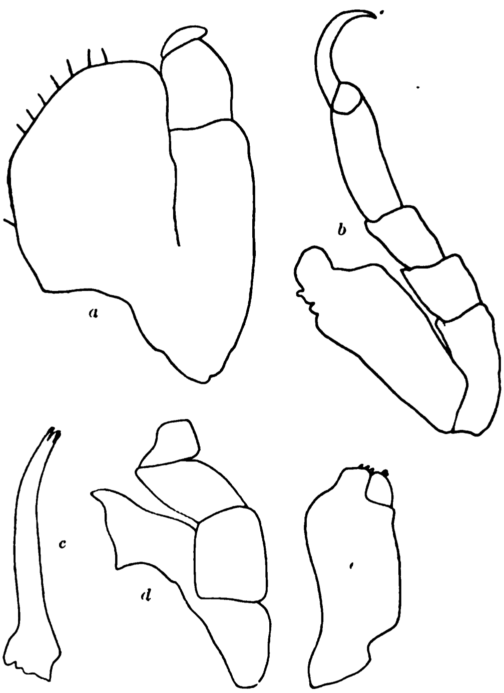

Fig. 231.—Anilocra laticauda. *a*, Maxilliped. × 27⅓. *b*, Seventh leg. × 27⅓. *c*, First maxilla. × 27⅓. *d*, Mandible. × 27⅓. *e*, Second maxilla. × 27⅓.

The first segment of the abdomen is as wide as the seventh thoracic segment. The abdomen is not set in the thorax and all the segments are distinct. The second, third, fourth, and fifth segments become gradually somewhat narrower. The sixth or terminal segment is not wider at the base than the fifth segment; it is widely rounded posteriorly, and is as long as wide, 7 mm.: 7 mm. The uropoda are as long as the terminal abdominal segment, are of equal length and width, and are rounded posteriorly.

All the legs are prehensile with long, narrow, curved dactyli, those of the second and third pairs being much longer than the others. The last pair of legs are longer than any of the others. There is a very low carina on the basis of the last four pairs of legs.[a]

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[a] See Schiœdte and Meinert for complete description of this form, the adult female, the young of the first stage, and the young of the second stage, Nat. Tidsskr. (3), XIII, 1881-1883, pp. 126-131.

ANILOCRA PLEBIA Schiœdte and Meinert.

Anilocra plebia Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XIII, 1881–1883, pp. 145–146, pl. x, fig. 3.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 528.

Localities.—Shores of Costa Rica; Central America.

Body elliptical, two or three times longer than wide (9:4). Head moderately large, subtriangular, one-third as wide as the fourth thoracic segment, much wider than long, very slightly immersed, the front rounded in a circle.

Eyes small, suboval, tumid, separated by a distance of more than half the width of the head.

The first pair of antennæ are straight, rather compressed, and extend with the two last articles to the anterior angle of the first thoracic segment and to the sixth article of the second pair of antennæ; they are composed of eight articles.

The second pair of antennæ are rather compressed, are a little narrower than the first pair of antennæ, and do not reach the posterior angle of the first thoracic segment; they are composed of nine articles.

The anterior margin of the first thoracic segment is manifestly trisinuated, the lateral sinuses being scarcely deeper than the median sinus.

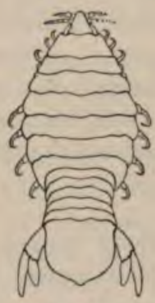

Fig. 232.—Anilocra plebia (after Schiœdte and Meinert). Young female. (Enlarged.)

The posterior angles of the first six segments of the thorax are scarcely or not at all produced, being rounded or obtuse. The posterior angles of the seventh segment are a little more produced and rounded. The angles of the seventh segment do not reach by a small distance the posterior angle of the first segment of the abdomen.

The epimera are projecting. The first three are rather wide or rather narrow, decreasing gradually in width, with the posterior margin widely rounded. The three posterior ones are narrow, subequal in width, with the posterior margin narrowly rounded. The epimera of the first and second pairs extend almost to the posterior angle of the segment; those of the third pair do not reach by a small distance the posterior angle of the segment; the fourth, fifth, and sixth pairs of epimera are subequal and do not reach by a large distance the posterior angle of the segment.

The first six pairs of legs gradually increase a little in length; those of the last pair are manifestly longer and a little more slender than the others. The ungulæ of the first pair are rather long and rather stout; those of the second, third, fourth, and fifth pairs are long or very long, rather stout, subequal in length; those of the sixth pair are long or rather long and rather stout; those of the seventh pair are rather short and slender.

The abdomen is covered at the base, is more than one and a half times longer than wide (8:5), and is much shorter than the thorax with the head (4:3). The first five segments gradually increase a little in length. The sides of the first five segments are a little roundly dilated, excavate, or emarginate; the first and second segments are obliquely truncated; the third, fourth, and fifth segments are gradually more deeply and more angularly emarginate.

The terminal segment of the abdomen is cordate, impressed at the base, obscurely carinated, much wider than long (6:5), manifestly longer than the other segments of the abdomen taken together (10:9). The uropoda are manifestly longer than the terminal abdominal segment (9:8); the inner branch is very much shorter and scarcely wider than the exterior branch, becoming narrower back of the middle, sublaminar, scarcely surpassing the apex of the last segment; the exterior branch is narrow, sickle-shaped.

Length 21.5 mm.

Color from gray to green, yellow on the terminal abdominal segment and the uropoda.[a]

36. Genus OLENCIRA Leach.

Body relaxed, rather stout, more or less distorted.

Head constricted at the base. First pair of antennæ separated at the base, rather compressed. Second pair of antennæ compressed. Eyes manifest.

Anterior margin of the first thoracic segment manifestly trisinuated. The posterior angles of the first six segments of the thorax not pro-

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[a] The above description is adapted from the following one of Schiœdte and Meinert's:

Elliptica, bis vel ter longior quam latior (9:4).

Caput mediocre, subtriangulum, quam annulus quartus trunci ter angustius, multo latius quam longius, levissime immersum, fronte in orbem rotundata. Oculi parvi, subovalis, tumidi, plus quam dimidia parte latitudinis capitis distantes. Antennæ primi paris subrectæ, compressiusculæ; angulum priorem annuli primi trunci articulis binis ultimis superantes, articulum sextum antennarum secundi paris explentes; 8-articulatæ.

Antennæ secundi paris compressiusculæ, quam antennæ primi paris paulo angustiores, angulum posticum annuli primi trunci non attingentes; 9-articulatæ.

Margo anticus annuli primi trunci manifesto trisinuatus, sinubus lateralibus quam sinu medio vix profundioribus.

Anguli postici annulorum sex priorum trunci vix vel non prominuli, rotundati vel obtusi; annuli septimi paulum prominuli, rotundati. Anguli annuli septimi angulum posticum annuli primi caudalis spatio parvo non attingentes.

Epimera subpendula; terna priora latiuscula vel angustiuscula, per paria sensim latitudine decrescentia, margine postico late rotundato; terna posteriora angusta, latitudine subæqualia, margine postico breviter rotundato. Epimera paris primi et secundi angulum annuli fere explentia; paris tertii angulum annuli spatio parvo non duced; those of the seventh segment produced. The epimera almost reach the posterior angles of the segments.

Terminal segment of abdomen subtriangular or subcordate. Uropoda much shorter than the terminal abdominal segment; inner branch scarcely shorter than the outer branch. Legs long; the first six pairs gradually increasingly longer; those of the seventh pair abruptly very much longer than the others. The basis of the four posterior pairs furnished with a carina. Ungulæ long, those of the first pair manifestly shorter than the others; those of the seventh pair manifestly longer than the others.[a]

OLENCIRA PRÆGUSTATOR (Latrobe).

Oniscus prægustator Latrobe, Trans. Amer. Philos. Soc., V, 1802, p. 77, pl. I.

Cymothoa prægustator Say, Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 395–396.

Olencira lamarkii Leach, Dict. Sci. Nat., XII, 1818, p. 351.—Desmarest, Consid. Gen. Crust., 1825, p. 307.—Milne Edwards, Hist. Nat. Crust., III, 1840, p. 264.

Olencira prægustator Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XIII, 1881–1883, pp. 152–154, pl. x, figs. 6–9.—Richardson, American Naturalist, XXXIV, 1900, p. 221; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 528–529.

Localities.—Potomac River; York Spit, Virginia; Dividing Cove; St. George's Island, Maryland; Fort Monroe, Head of Cockrell Creek, Hampton Creek, Lower Chesapeake Bay; Cape Charles, Virginia; off Great Wicomico; Pensacola and St. Mary's River, Florida; Mobile, Alabama; Winyah Bay, South Carolina (mouths of menhaden); Zoological Park, Washington City (on bug-fish); Crisfield, Maryland; Florida; Georgetown, District of Columbia.

Parasite of *Brevoortia patronus; Brevoortia tyrannus;* bug-fish.

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attingentia; paris quarti, quinti, sexti angulum annuli spatio magno, subæquali, non attingentia. Pedes parium sex priorum per paria sensim longitudine paulum crescentes; paris ultimi ceteris manifesto longiores et paulo tenuiores. Ungulæ paris primi longiusculæ, crassiusculæ; paris secundi, tertii, quarti, quinti longæ vel perlongæ, crassiusculæ, longitudine subæquales; paris sexti longæ vel longiusculæ; crassiusculæ; paris septimi breviusculæ, subtenues.

Cauda ad basin obtecta, longior quam latior plus sesqui (8:5), quam truncus cum capite multo brevior (4:3). Annuli quinque priores sensim longitudine paulum crescentes. Latera annulorum quinque priorum paulum rotundate dilatata, excavata, vix marginata; annuli primi et secundi oblique truncata; annuli tertii, quarti, quinti per paria sensim profundius atque magis angulate emarginata.

Annulus analis cordatus, ad basin impressus, obscure carinatus, multo latior quam longior (6:5), ceteris annulis caudalibus conjunctis manifesto longior (10:9). Pedes anales annulo anali manifesto longiores (9:8); ramus interior quam exterior valde brevior et vix latior, pone medium angustatus, sublaminatus, apicem annuli vix superans; ramus exterior angustatus, subfalcatus.

Long. 21, 5 mm.

Color ex griseo olivaceus, annulo anali cum pedibus analibus flavicans.—Schiœdte and Meinert, Nat. Tidsskr. (3), XIII, 1881–83, pp. 145–146.

[a] See Schiœdte and Meinert for characters of genus, Nat. Tidsskr. (3), XIII, 1881–83, pp. 150–151.

Body narrow, elongate, gradually increasing in width to the seventh thoracic segment, 6½ mm. wide, 26 mm. long.

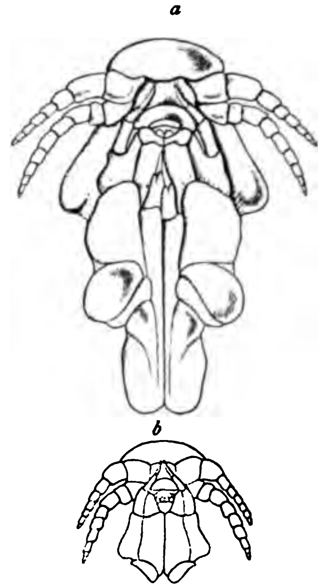

FIG. 233.—OLENCIRA PRÆGUSTATOR (AFTER SCHIŒDTE AND MEINERT). *a*, HEAD OF FEMALE SHOWING ANTENNÆ AND MOUTH PARTS. *b*, HEAD OF MALE SHOWING SAME. (ENLARGED.)

Head as wide at the base as it is long—3 mm. : 3 mm.—gradually becoming more and more narrow to the anterior extremity, which is widely rounded. The anterior extremity is half as wide as the base, being 1½ mm. in width. The eyes are large, oblong, twice as long as wide, composite, and situated in the posterior half of the head at the post-lateral angles. The first pair of antennæ are composed of eight articles, and extend to the seventh article of the second pair of antennæ. The basal articles of the first antennæ are not adjacent, but are separated by a distance of 1 mm. The second pair of antennæ are composed of ten articles and extend to the posterior margin of the head. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

The first and fourth segments of the thorax are longest and are subequal, each being 2½ mm. in length; the second and third are subequal and each is 2 mm. long; the fifth and sixth are subequal and each is 1½ mm. long; the seventh segment is the shortest and is 1 mm. in length. The epimera are distinctly separated on all the segments, with the exception of the first; they are narrow, elongate plates, which do not reach the posterior margins of the segments, except the seventh pair.

The abdomen is abruptly narrower than the thorax. The first segment is deeply set in the thorax and is covered at the sides by the seventh thoracic segment. The segments increase very little in width. The sixth or terminal segment is a little longer than wide, 5 mm.: 6 mm.; it is triangularly produced to a narrowly rounded apex.

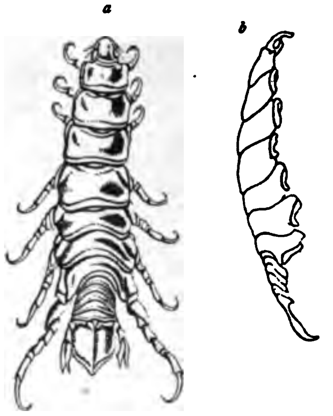

FIG. 234.—OLENCIRA PRÆGUSTATOR (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, LATERAL VIEW. (ENLARGED.)

All the legs are prehensile, with long, narrow curved dactyli. They increase slightly in length to the seventh pair, which are abruptly very much larger and longer than the sixth pair, being extremely long. The last three pairs have the basis furnished with a low carina.

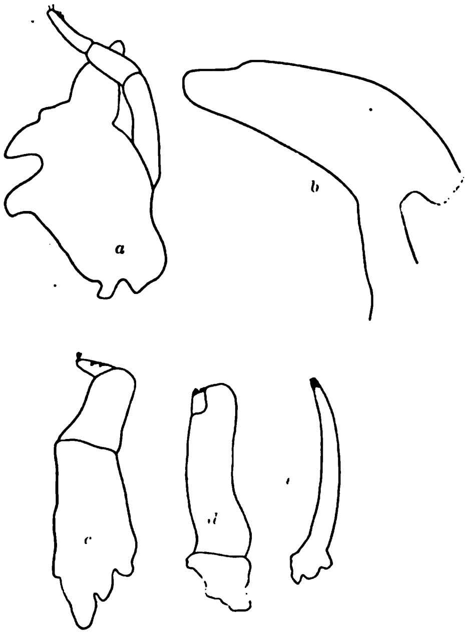

FIG. 235.—OLENCIRA PRÆGUSTATOR. *a*, MANDIBLE. × 27½. *b*, MANDIBLE WITHOUT PALP. × 51⅓. *c*, MAXILLIPED. × 27½. *d*, SECOND MAXILLA. × 27½. *e*, FIRST MAXILLA. × 27½.

37. Genus CERATOTHOA Dana.[a]

Body oblong.

Head but little immersed or set in the first thoracic segment. Eyes small. The first pair of antennæ are dilated, contiguous at the base. The second pair of antennæ are compressed.

Anterior margin of the first segment of the thorax rounded. Epimera of the first thoracic segment in the female with a carina produced in the form of a spoon or a tubercle and directed anteriorly. The anterior epimera do not reach by a great but gradually decreasing distance the posterior angle of the segment. The posterior epimera almost reach or extend a little beyond the posterior angles of the segments.

The abdomen is deeply immersed or set in the thorax. Terminal segment transverse. The legs are rather long, with the exception of the first and second pairs. The ungulæ are long and strongly curved, those of the third pair in the female being the longest of all, and abruptly longer than those of the second pair. There is a high carina on the basis of the four posterior pairs of legs.

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[a] See Schiœdte and Meinert for characters of genus, Nat. Tidsskr. (3), XIII, 1881-83, pp. 299-300.

The male is smaller than the female.

CERATOTHOA IMPRESSA (Say).

Cymothoa impressa SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 397.

Ceratothoa linearis DANA, U. S. Expl. Exp. Crust., XIV, 1853, p. 752, pl. L, figs. 1a–1d.

Ceratothoa exocœti CUNNINGHAM, Trans. Linn. Soc. London, XXVII, 1869–71, p. 499, pl. LIX, fig. 5.

Glossobius linearis SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XIII, 1881–83, pp. 301–308, pl. XII, figs. 1–2.

Ceratothoa linearis STEBBING, Hist. of Crust., 1893, p. 354.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 221; Proc. U. S. Nat. Mus., XXIII, 1901, p. 529.

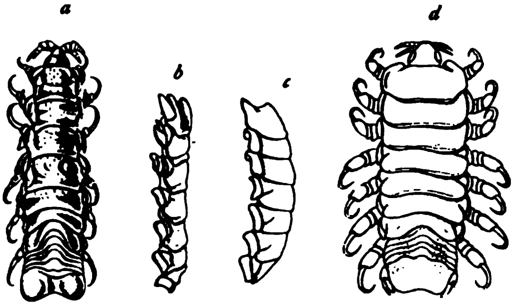

FIG. 236.—CERATOTHOA IMPRESSA (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, LATERAL VIEW OF THORAX. *c*, LATERAL VIEW OF THORAX OF MALE. *d*, ADULT MALE. (ENLARGED.)

Localities.—From latitude 42° to 21° north; latitude 8° to 10° north, longitude 40° to 50° west; latitude 34° north, longitude 51° west; Rio de Janeiro, Brazil; in the Gulf Stream everywhere; Cape May, New Jersey (Say).

Having had an opportunity to examine Say's type specimen of *Cymothoa impressa*, deposited in the Philadelphia Academy of Natural Sciences, its identity with *Ceratothoa linearis* Dana is found to be unquestionable. The earlier name will therefore have to be adopted for this species.

Parasite of flying-fish, *Exocœtus* sp.; *e. g.*, *Exocœtus exiliens*, *Ex. lamelliferus*, *Ex. brachycephalus* (Schiœdte and Meinert); on *Coryphæna* sp.

Body elongate, a little more than three times longer than wide, 10 mm.: 33 mm.

Head a little wider than long, 3 mm.: 4 mm., not deeply set in the thorax, with the front excavate on either side of a broad and elongate median process, 1 mm. in length and 1 mm. in width, the apex of which is obtusely pointed. The antennæ fit in these excavations. The antero-lateral angles of the head are acutely pointed. The eyes are small, about twice as wide as long, and somewhat obliquely placed at the sides of the head, about halfway between the antero-lateral and post-lateral angles. The first pair of antennæ are composed of seven articles, the basal articles in each antenna being adjacent on the ventral side. The first antennæ extend just below the eyes. The second pair of antennæ are composed of eleven articles, the last three being very minute. The articles of both pairs of antennæ are greatly dilated and flattened. The second antennæ extend to the posterior margin of the head. The maxillipeds have a palp of two articles. The palp of the mandibles is very large and conspicuous and is composed of three articles. The second or posterior maxillæ are very large and conspicuous, are bilobed at the tip, both lobes being furnished with small hooks.

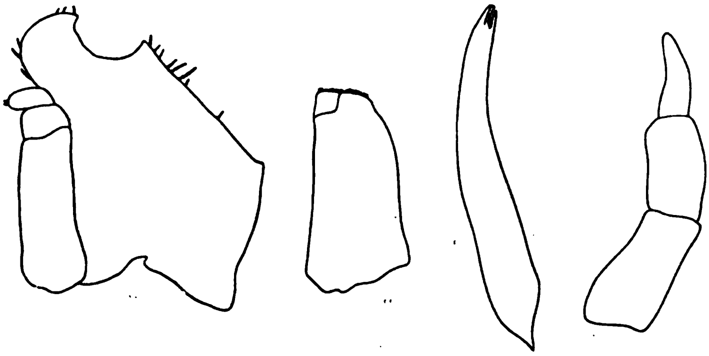

FIG. 237.—CERATOTHOA IMPRESSA. *a*, MAXILLIPED OF FEMALE. × 27½. *b*, SECOND MAXILLA. × 27½. *c*, FIRST MAXILLA. × 51⅓. *d*, PALP OF MANDIBLE. × 27½.

The first four segments of the thorax are large and about equal in length; the fifth segment is half as long as any of the four preceding segments; the sixth and seventh segments are very short in the median dorsal line and each is about one-half as long as the fifth segment. The first thoracic segment has the antero-lateral expansion produced in a carinated process, produced outward and forward and terminating acutely a little anterior to the antero-lateral expansion of the segment. The epimera are distinctly separated on all the following six segments. In the second segment they are directed forward

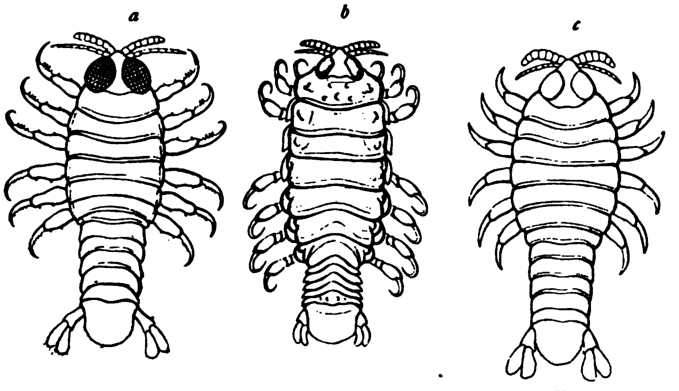

FIG. 238.—CERATOTHOA IMPRESSA (AFTER SCHIŒDTE AND MEINERT). *a*, YOUNG OF THE SECOND STAGE. *b*, YOUNG OF THE THIRD STAGE. *c*, YOUNG OF THE FIRST STAGE. (ENLARGED.)

and project in an anteriorly acute process. In the third, fourth, and fifth segments the epimera are narrow, elongated plates, occupying the anterior half of the segments. In the last two segments they are also narrow and elongate, and occupy nearly the entire length of the segment.

The abdomen is abruptly narrower than the thorax, the first segment being much narrower and deeply set in the thorax. The four following segments are as wide as the seventh thoracic segment, and gradually increase in width to the sixth segment, which is very wide. The terminal segment is nearly twice as wide as long; it is 10 mm. wide, 4 mm. long in the median longitudinal line, and 6 mm. long in the lateral portions. The post-lateral angles of this segment are rounded, the posterior margin being deeply excavate. The uropoda are as long as the terminal segment, are equal in width, and are rounded at the extremities. The outer branch is very slightly shorter than the inner branch.

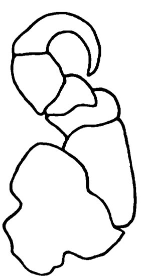

Fig. 239.—Ceratothoa impressa. Seventh leg. × 4½.

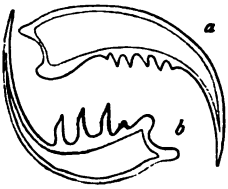

Fig. 240.—Ceratothoa impressa (After Schiœdte and Meinert). *a*, Ungula of first pair of legs of young of second stage. *b*, Ungula of sixth pair of legs of young of second stage. (Enlarged.)

All the legs are prehensile, with long, narrow curved dactyli, those of the fourth pair being the longest. There is a high carina on the basis of the last four pairs of legs, the height of the carina increasing from the fourth to the seventh pair, where it is extremely high.[a]

38. Genus MEINERTIA Stebbing.[b]

Body oblong.

Head more or less deeply immersed or set in the first thoracic segment. Eyes distinct. First pair of antennæ dilated, contiguous at the base. Second pair of antennæ compressed.

First thoracic segment with the anterior margin widely sinuated or almost straight. Anterior epimera do not reach by a great but gradually decreasing distance the posterior angle of the segments. The posterior epimera almost reach or sometimes extend a little beyond the posterior angles of the segments.

Terminal segment of abdomen triangular, semicircular, often bilobed.

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[a] For description of the male and the female and the young of the first, second, and third stages, see Schiœdte and Meinert, Nat. Tidsskr. (3), XIII, 1881-83, pp. 301-308.

[b] See Schiœdte and Meinert for characters of genus, Nat. Tidsskr. (3), XIII 1881-83, pp. 322-323.

The first three pairs of legs are more or less manifestly shorter than the others. Ungulæ subequal.

Male is much smaller in size than female.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS MEINERTIA.

- *a*. First pair of antennæ short, extending to the eye or to the posterior margin of the head. Second pair of antennæ short, extending to the posterior margin of the head, and composed of only eight or nine articles. Head more or less deeply set in first thoracic segment.
  - *b*. High carina present on the basis of the last four pairs of legs. Uropoda extend beyond the terminal abdominal segment. Eyes small. Last segment of abdomen about twice as wide as long.
    - *c*. Body convex. Terminal abdominal segment trapezoidal and rugose dorsally. *Meinertia gaudichaudii* (Milne Edwards)
    - *c′*. Body flattened from fourth segment to end of abdomen. Terminal segment semicircular and smooth dorsally .... *Meinertia deplanata* (Bovallius)
  - *b′*. No carina developed on the basis of the legs. Uropoda extend only a little beyond half the length of the abdomen. Eyes large. Last segment of abdomen nearly three times as wide as long......... *Meinertia gilberti* Richardson
- *a′*. First pair of antennæ long, extending to the middle of the first thoracic segment. Second pair of antennæ long, extending to the posterior margin of the first thoracic segment, and composed of fourteen articles. Head but little immersed in first thoracic segment..................... *Meinertia transversa* Richardson

MEINERTIA GAUDICHAUDII (Milne Edwards).

Cymothoa gaudichaudii Milne Edwards, Hist. Nat. Crust., III, 1840, p. 271.

Ceratothoa rapax Heller, Reise Novara, Crust., 1865, p. 146, fig. 17.

Ceratothoa gaudichaudii Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XIII, 1881–83, pp. 335–340, pl. xiii, figs. 11–15.

Meinertia gaudichaudii Stebbing, Hist. of Crust., 1893, p. 345.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 829; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 171; Proc. Wash. Acad. Sci., III, 1901, p. 568.—Stebbing, Willey's Zool. Results, 1902, p. 643.

Localities.—Mazatlan; Pacific Ocean following the shores of Central America; Coquimbo; shores of Chili; Callao; Peruvian shores; Chinchenses Islands; Black Bight, Albemarle Island, Galapagos Islands; 200 miles north of Wenman Island, Galapagos Islands; Panaieti, Louisiade Archipelago, New Guinea.

Found in the mouth of *Thunnus* sp.

Body elongate, nearly three times as long as broad; 16 mm.: 45 mm.

Head nearly twice as wide as long (4 mm.: 7 mm.) somewhat triangular in shape, with apex obtuse. The head is deeply set in the first thoracic segment, the narrow and acute antero-lateral angles of which extend half the length of the head. Eyes small, distinct, irregular in outline, but inclined to be square, and placed at the sides of the head, a little below the middle.

The first pair of antennæ are composed of seven articles, the two first ones being almost fused; they extend just below the eye. The second pair of antennæ are composed of nine articles and extend to the posterior margin of the head. The basal articles of the first pair of antennæ are adjacent on the ventral side. The articles of both pairs of antennæ are greatly dilated and flattened. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles, the terminal one being very slender and minute. The second maxillæ terminate in two lobes furnished with small hooks.

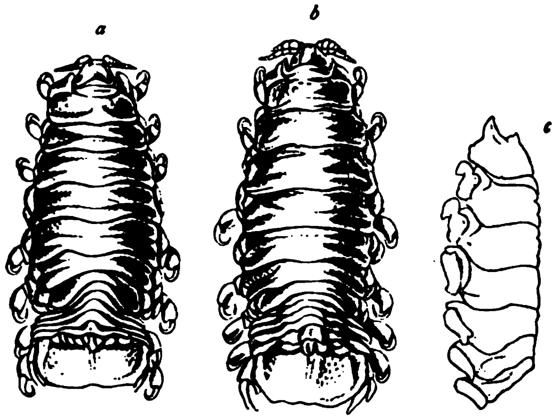

FIG. 241.—MEINERTIA GAUDICHAUDII (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, ADULT FEMALE. *c*, LATERAL VIEW OF THORAX. (ENLARGED.)

The first segment of the thorax is longer than any of the others, being 6 mm. in length; the second and fifth segments are subequal, each being 4 mm. long; the third and fourth are each 5 mm. in length; the sixth segment is 3 mm. long; the seventh is 2 mm. long. The antero-lateral angles of the first segment are narrow and acute and are produced forward to about the middle of the head. The epimera are distinctly separated on all the six following segments. They are narrow, elongated plates, not extending quite to the posterior margins of the segments.

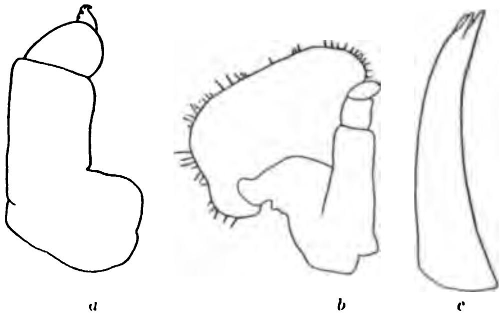

FIG. 242.—MEINERTIA GAUDICHAUDII. *a*, MAXILLIPED OF MALE. × 20½. *b*, MAXILLIPED OF FEMALE. × 20½. *c*, FIRST MAXILLA. × 39.

The abdomen is deeply set in the thorax. The first segment has the sides covered by the last thoracic segment. The four following segments are as wide as the seventh thoracic segment or wider. The sixth or terminal segment is trapezoidal, almost twice as wide as long, 7 mm : 13 mm. The post-lateral angles are rounded and the posterior margin straight. The uropoda are a little longer than the terminal abdominal segment. The inner branch is slightly longer than the outer branch. Both are narrow, elongate, and produced to acute and tapering extremities.

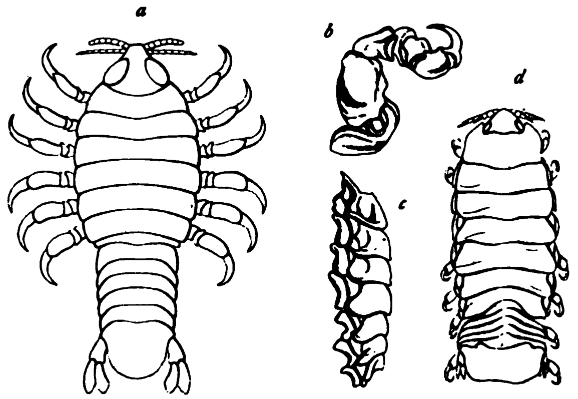

Fig. 243.—Meinertia gaudichaudii (After Schiœdte and Meinert). *a*, Young of first stage. *b*, Second leg of adult male. *c*, Lateral view of thorax of adult male. *d*, Adult male. (Enlarged.)

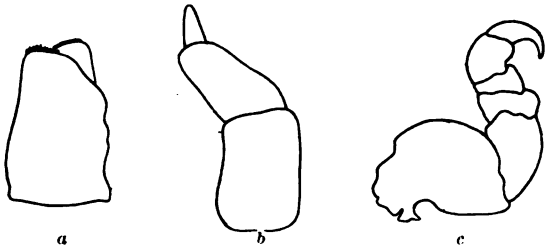

Fig. 244.—Meinertia gaudichaudii. *a*, Second maxilla. × 33. *b*, Palp of mandible. × 33. *c*, Leg of seventh pair. × 3.

The legs are all prehensile, and terminate in short, stout dactyli. There is a high carina on the basis of the last four pairs of legs, the carina increasing in height from the fourth to the seventh pair, where it is extremely high.[a]

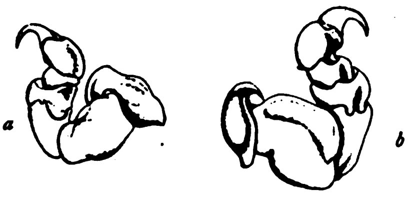

Fig. 245.—Meinertia gaudichaudii (After Schiœdte and Meinert). *a*, Second leg of adult female. *b*, Seventh leg of adult female. (Enlarged.)

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[a] For description of male, female, and young of the first stage, see Schiœdte and Meinert, Nat. Tidsskr., (3), XIII, 1881-1883, pp. 335-340.

MEINERTIA DEPLANATA (Bovallius).

Ceratothoa deplanata BOVALLIUS, Bihang till K. Sv. Vet.-Akad. Handl., X, No. 11, 1885, pp. 20–22.

Locality.—Coast of Haiti, West Indies.

"The form of the body is elongate, the anterior and posterior ends are only a little narrower than the middle, the anterior part is not very convex; from the fourth segment of the pereion to the end of the urus the body is quite flattened. The surface is smooth, without spots.

"The head is broad, triangular, with broadly rounded front, the sides rounded, not emarginate. The upper side is smooth, convex. The eyes are mediocre, rhomboidal, surrounded by dark diffuse spots.

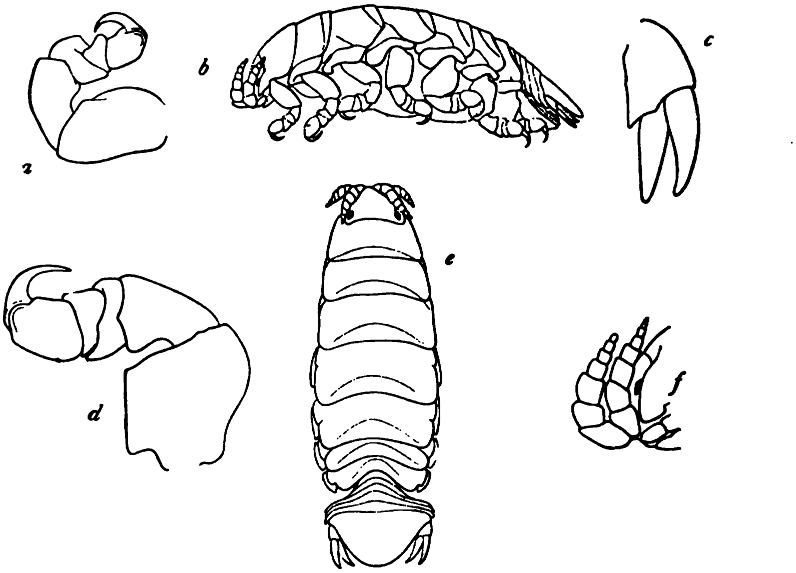

FIG. 246.—MEINERTIA DEPLANATA (AFTER BOVALLIUS). *a*, FIRST LEG. *b*, LATERAL VIEW OF FEMALE. *c*, UROPOD. *d*, SEVENTH LEG. *e*, DORSAL VIEW OF FEMALE. *f*, HEAD WITH BOTH ANTENNÆ. (ENLARGED.)

"The first pair of antennæ are nearly as long as the second, thick, not compressed, seven-jointed; they reach quite to the anterior margin of the first pereional segment. The first joint is the longest; it is as long as the two following together. The three last ones are small, tapering.

"The second pair of antennæ are but a little more slender than the first pair, eight-jointed; the first joint the longest; the four last ones small, tapering; the last very minute.

"The pereion is smooth, the sides feebly rounded. The processes of the first segment are very broad, short, bent downward; the first segment is shorter than the fifth, but as long as the second. The sixth and seventh segments together are shorter than the second segment. The hinder corners of the two first segments are nearly rectangular; those of the third and fourth truncated; those of the last three rounded.

"The epimerals of the second and third segments are broader at the posterior end, bent downward at the anterior. That of the second segment occupies the whole side of the segment; those of the third and fourth segments scarcely more than two-thirds of it; those of the fifth and sixth segments fully three-fourths of it, and the last one the whole of the segment. The epimerals of the fourth, fifth, and sixth segments are broader at the anterior margin, narrower behind. The last one is oblong, with rounded ends.

"The first pair of pereiopoda have the tibia broadly extended, the dactylus short. The two following pairs are subequal, with the femora much longer than broad. The following four pairs have much broader femora and strongly developed carinæ. In the seventh pair the femur is as broad as long, the hinder margin is straight.

"The pleon is as broad at the base as long, the first segment longer than the second, but narrower than half of the fifth (2 : 5). The three last pleonal segments are broader than the urus (10 : 9) and a little narrower than the fifth (or fourth) segment of the pereion (10 : 11). The whole pleon equals the fifth pereional segment in length.

"The urus is broad, nearly semicircular, not quite twice as broad as long (9 : 5); the upper side is perfectly plain and smooth.

"The pleon and urus together are about a third of the length of the pereion with the head (18 : 51).

"The uropoda reach a little beyond the posterior margin of the urus. The peduncles are long and stout, nearly as long as the inner ramus (14 : 17). The inner ramus reaches a little beyond the outer. It is oblong-lanceolate. The exterior one is falciform.

"Color, bright yellow.

"Length, 18 mm."—BOVALLIUS.[a]

MEINERTIA GILBERTI Richardson.

Meinertia gilberti RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 53.

Locality.—Mazatlan.

Parasite of *Mugil hospes*.

Head set in first segment of thorax, the antero-lateral prolongations of which extend forward to about the middle of the eye. Shape of the head somewhat triangular; posterior margin straight; anterior margin produced somewhat at the middle, but quite rounded. Eyes very large, far apart, and situated at the sides of the head. First pair of antennæ consist of seven joints and extend to the middle of the eye;

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[a] Bihang till K. Sv. Vet.-Akad. Handl., X, No. 11, 1885, pp. 21-22.

second pair consist of eight joints and reach the posterior margin of the head.

The first four segments of the thorax are about equal in length, the second being somewhat shorter. The last three segments decrease gradually in length. The epimera are narrow pieces at the sides of the segments; in the first five segments they do not reach the posterior margin of the segments, although the fifth pair more nearly reach the posterior margin than the others; the epimera of the last two segments reach quite to the posterior margin.

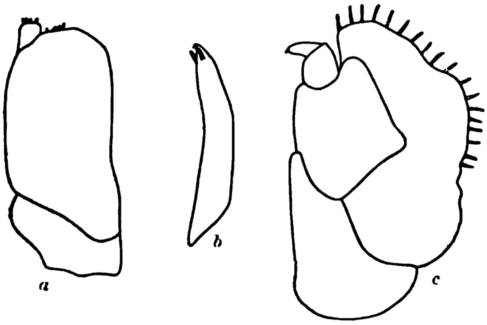

FIG. 247.—MEINERTIA GILBERTI. *a*, SECOND MAXILLA. × 27½. *b*, FIRST MAXILLA. × 27½. *c*, MAXILLIPED. × 15½.

The first segment of the abdomen is as wide as the last thoracic segment. The others are wider, increasing in width gradually to the terminal segment. The last segment is about three times as broad as long, and quadrangular in shape. The uropoda are short, reaching only a little beyond half the length of the abdomen; both branches are alike and of equal length.

The legs all terminate in long recurved unguli. There is no high carina developed on the basis of any of the legs.

Color reddish brown.

Three specimens, two males and one female, were collected by Prof. C. H. Gilbert at Mazatlan. They were found in the mouth of *Mugil hospes*.

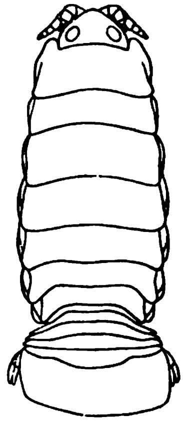

FIG. 249.—MEINERTIA GILBERTI. × 2½.

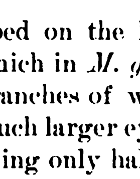

FIG. 248.—MEINERTIA GILBERTI. LEG OF SEVENTH PAIR. × 7.

Type.—Cat. No. 29080, U.S.N.M.

This species differs chiefly from *M. gaudichaudii* (Milne Edwards)[a] from near locality, in the absence of high carinæ, which in *M. gaudichaudii* are strongly developed on the last four pairs of legs; in the much shorter uropoda, which in *M. gaudichaudii* extend beyond the terminal segment, both branches of which are narrowly pointed at their extremities; in the much larger eyes, and in the smaller size of the species, the adult female being only half the size of the adult female of *M. gaudichaudii*.

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[a] Naturhistorisk Tidsskrift, XIV, 1883-84, pp. 335-340, pl. XIII, figs. 11-15.

MEINERTIA TRANSVERSA Richardson.

Meinertia transversa RICHARDSON, American Naturalist, XXXIV, 1900, p. 221; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 529–530.

Locality.—Between the delta of the Mississippi and Cedar Keys, Florida.

Head very little immersed in first thoracic segment, large, subtriangular, anterior margin pointed with sides slightly sinuate. Eyes situated at extreme post-lateral margins, almost obscure. First pair of antennæ, with joints dilated, issuing close together, eight articulate. Second pair of antennæ slender, extending a little beyond posterior margin of first thoracic segment; fourteen jointed.

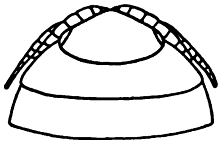

FIG. 250.—MEINERTIA TRANSVERSA. HEAD.

Thoracic segments subequal in length.

Abdomen not at all immersed. All the segments visible and equal in width and length. Terminal segment subtriangular with apex round, impressed at the base, equal in length to the first five segments taken together. Uropoda a little longer than apex of terminal segment, branches similar in shape, oar-like, and of equal length.

Legs increasing in length from first to seventh pair.

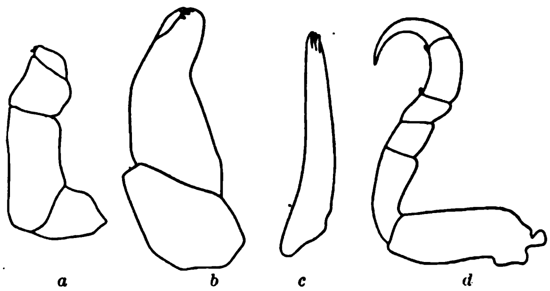

FIG. 251.—MEINERTIA TRANSVERSA. *a*, MAXILLIPED. × 20¼. *b*, SECOND MAXILLA. × 39. *c*, FIRST MAXILLA. × 39. *d*, SEVENTH LEG. × 11¼.

Color yellowish brown.

One specimen from between the delta of the Mississippi and Cedar Keys, Florida, collected by the U. S. Bureau of Fisheries' steamer *Albatross.*

Type.—Cat. No. 9728, U.S.N.M.

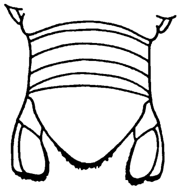

FIG. 252.—MEINERTIA TRANSVERSA. ABDOMEN.

39. Genus AGARNA Schiœdte and Meinert.

Body compressed from side to side and hunched, very asymmetrical. One side of the posterior segments of the thorax flattened and dilated.

Head deeply immersed. First pair of antennæ separated but little at the base, almost contiguous, rather compressed.

Anterior margin of the first thoracic segment very deeply sinuated; antero-lateral angles scarcely produced, rounded. Epimera present on all the segments of the thorax with the exception of the first and the seventh. There are two pairs of epimera on the fourth thoracic segment and two pairs of legs are attached to this segment. The seventh segment has no appendages.

Abdomen continuous with thorax, not narrower than thorax; deeply immersed. Carina on the four posterior pairs of legs moderately high.

AGARNA CARINATA Schiœdte and Meinert.

Agarna carinata Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XIV, 1883–84, pp. 329–334, pl. xiii, figs. 1–3.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 531.

Localities.—St. Croix Island, West Indies; Key West, Florida.

Found on *Teuthis chirurgus.*

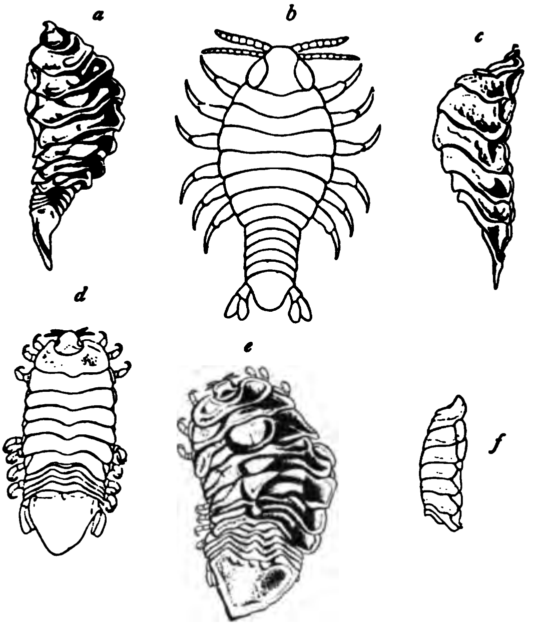

Fig. 253.—Agarna carinata (After Schiœdte and Meinert). *a*, Lateral view of adult female (left side). *b*, Young of the first stage. *c*, Lateral view of adult female (right side). *d*, Adult male. *e*, Adult female. *f*, Lateral view of thorax of adult male. (All enlarged.)

Body very asymmetrical, with the last four thoracic segments on one side abruptly very much wider than the first three. Body twisted to one side, which is shorter than the other side, twice as long as its width above the fourth thoracic segment, 9 mm.: 18 mm. At the fourth and fifth thoracic segments it is 11 mm. wide. The body is also very much hunched, rising very high, until at the third and fourth segment it is 7 mm. high.

The head is wider than long, 2 mm.: 3 mm., somewhat rectangular, with the anterior margin widely rounded. The eyes are small, round, composite and situated in the post-lateral angles of the head. The first pair of antennæ are composed of seven articles. The basal articles are almost contiguous. The second pair of antennæ are composed of "ten" articles. The head is deeply set in the first thoracic segment, the antero-lateral angles of which extend to the anterior margin of the head. The maxilliped has a palp of two articles. The palp of the mandibles is composed of three articles.

The first, second, and third thoracic segments are equal in length, each being 2 mm. long. The fourth and fifth are subequal, each being 1 mm. in length. The sixth and seventh are each only ½ mm. long. The epimera are not distinctly separated on the first segment. The following five segments have distinct epimera. There are none on the seventh segment, and there are no appendages to this segment. There are two pairs of legs attached to the fourth segment, two legs on either side, and two pairs of epimera. The epimera of the second and third segments are narrow plates, extending the full length of the lateral margin on the shortened side of the body, the epimera of the third segment on the longer side not extending quite to the post-lateral angle. The fourth segment has two pairs of epimera, an anterior and a posterior pair; the two are equal in size on the short side, the anterior one on the long side of the body being small, the posterior one being transversely elongated, not laterally placed, but extending along the posterior margin of the lateral expansion of the segment. The epimera of the fifth and sixth segments, on the short side of the body, occupy the post-lateral angles; those of the long side are transversely elongated, not laterally, but posteriorly placed on the lateral expansions of the segments. There are no epimera on the seventh segment.

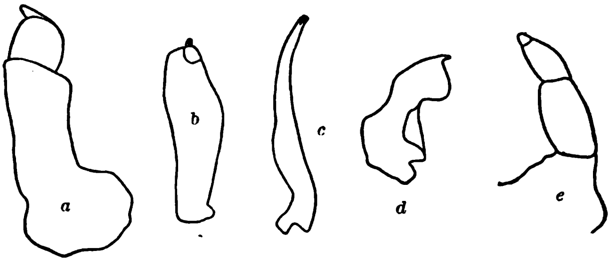

FIG. 254.—AGARNA CARINATA. *a*, MAXILLIPED. × 29. *b*, SECOND MAXILLA. × 29. *c*, FIRST MAXILLA. × 29. *d*, MANDIBLE. × 29. *e*, PALP OF MANDIBLE. × 29.

The abdomen is deeply set in the thorax, the seventh thoracic segment covering the lateral parts of the first two or three segments. The first segment of the abdomen is as wide as the last thoracic segment; the following segments gradually increase in width, especially on the shorter side of the body, so that the abdomen here becomes wider than the thorax. The terminal segment is large, triangular in shape, with apex rounded; it is 6 mm. long and 8 mm. wide at the base. The uropoda are very short, extending less than one-third the length of the abdomen. The outer branch is a little longer and wider than the inner branch.

The legs are all prehensile, with short, stout, curved dactyli. The ischium of the last four pairs is flattened and very much longer than in the first three pairs. There is also a moderately high carina on the basis of the last four pairs of legs.[a]

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[a] For complete description of this form, the male and female and the young of the first stage, see Schiœdte and Meinert, Nat. Tidsskr., (3) XIV, 1883–84, pp. 329–3

40. Genus INDUSA[a] Schiœdte and Meinert.

Body convex, anteriorly narrowed, or compressed from side to side. Head but little immersed. First pair of antennæ almost contiguous at the base, slender, not dilated.

Anterior margin of the first thoracic segment widely sinuated, the antero-lateral angles but little produced, rounded.

Abdomen but little immersed.

INDUSA CARINATA[b] Richardson.

Indusa carinata RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 52.

Locality.—West coast of Panama.

Parasite of *Mugil hospes*.

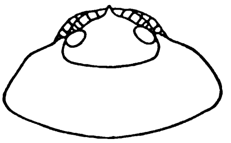

FIG. 255.—INDUSA CARINATA. HEAD AND FIRST THORACIC SEGMENT. × 5.

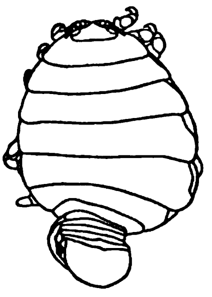

FIG. 256.—INDUSA CARINATA. × 2½.

Body very convex, being highly and roundly elevated. Thorax large, rounded, almost as wide as long, the last two segments rapidly converging to the narrow abdomen. Abdomen nearly three times narrower than greatest width of thorax, with all the segments of equal width.

Head about two and a half times narrower than first thoracic segment and four times narrower than fourth segment; front triangular in shape and produced into an acute point projecting between the basal joints of the antennæ. Eyes distinct and situated at the sides and about the middle of the head. First pair of antennæ, which are almost contiguous, being separated only by the very acute median point, reach to the eyes; flagellum seven jointed. Second pair of antennæ extend to the posterior margin of the head; flagellum nine jointed.

First thoracic segment rounded anteriorly and posteriorly, the sides of the segment surrounding the head, the lateral angles extending to the eyes. The first four segments gradually increase in width. The fourth and fifth are about equally wide. The sixth and seventh rapidly decrease in width, converging to the narrow abdomen. The epimera are well developed on all the segments with the exception of the first; they are narrow and elongate, rounded posteriorly and not reaching the posterior margin of their respective segments.

The abdomen is likewise very convex and is nearly three times narrower than the thorax at its greatest width. The segments are of

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[a] Schiœdte and Meinert, Naturhistorisk Tidsskrift (3), XIV, pp. 334–335.

[b] This species is included because the fish on which it is parasitic is found on the coast of Mexico.

equal width. The terminal segment is rounded posteriorly or slightly triangular. The uropoda are very short, less than half the length of the terminal segment; the branches are equal in length.

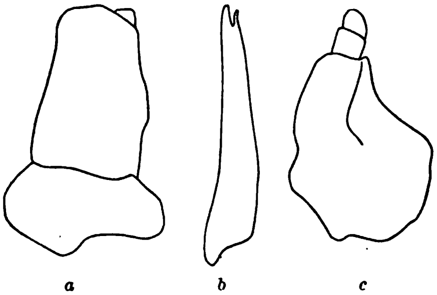

FIG. 257.—INDUSA CARINATA. *a*, SECOND MAXILLA. × 39. *b*, FIRST MAXILLA. × 39. *c*, MAXILLIPED. × 20¼.

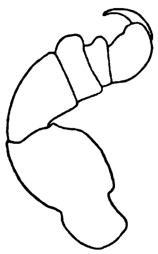

FIG. 258.—INDUSA CARINATA. LEG OF SEVENTH PAIR. × 7.

There is a high carina on the four posterior pairs of legs, and a small one on the three anterior pairs. Color reddish brown.

Two specimens, a male and a female, were collected by Prof. C. H. Gilbert from the west coast of Panama. They were found in the mouth of *Mugil hospes*.

Type.—Cat. No. 28961, U.S.N.M.

41. Genus CYMOTHOA Fabricius.

Body ovate. Head more or less deeply immersed.

First pair of antennæ widely separated at the base, rather compressed. First thoracic segment manifestly longer than the second; its anterior margin more or less sinuated, with the anterior angles short or produced. Epimera distinct on all the segments with the exception of the first; those of the first five pairs do not reach by a greater or less distance the posterior angle of the segment; the posterior ones reach the posterior angles of the segment or extend beyond by a small distance.

The abdomen is deeply immersed, manifestly separated from the thorax, and abruptly narrower than the thorax. The legs are rather short, those of the first three pairs being a little shorter than the others. Carina of the four posterior pairs of legs high.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CYMOTHOA.

a. Antero-lateral angles of the first thoracic segment extend half the length of the head or less. Eyes distinct or only traces of eyes apparent. First segment of thorax one and a half times longer than second segment. Uropoda short, shorter than the terminal abdominal segment.
  b. Antero-lateral angles of the first thoracic segment narrow.
    c. Antero-lateral angles of the first thoracic segment acutely produced and reaching the middle of head............................*Cymothoa excisa* Perty

c′. Antero-lateral angles of the first thoracic segment obtusely rounded, not reaching the middle of the head.......... *Cymothoa exigua* Schiœdte and Meinert

b′. Antero-lateral angles of the first thoracic segment wide. *Cymothoa caraibica* Bovallius

a′. Antero-lateral angles of the first thoracic segment very large and wide, half as wide as the head, rounded and extending to the anterior margin of the head. No traces of eyes present. First thoracic segment twice as long as second segment. Uropoda as long as the terminal abdominal segment. Outer branch slightly shorter than inner branch................ *Cymothoa œstrum* (Linnæus)

CYMOTHOA EXCISA Perty.

Cymothoa excisa PERTY, Del. Amin., 1830-34, p. 211.

Cymothoa parasita SAUSSURE, Revue Mag. Zool. (2), IX, 1857, p. 306; Mém. Soc. Phys. Genève, XIV, Pt. 2, 1858, p. 485, pl. v, fig. 44.

Cymothoa excisa SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XIV, 1883-84, pp. 238-244, pl. vi, figs. 11-16. (See Schiœdte and Meinert for above synonymy.)—RICHARDSON, American Naturalist, XXXIV, 1900, p. 221; Proc. U. S. Nat. Mus,, XXIII, 1901, p. 530.

Localities.—Massachusetts; Florida Reefs; Charleston Harbor, South Carolina; Bahamas; Biloxi, Mississippi; Cuba; Maranhao; Rio Janeiro; South Florida; Key West, Florida; Porlamar, Margarita Island, Venezuela.

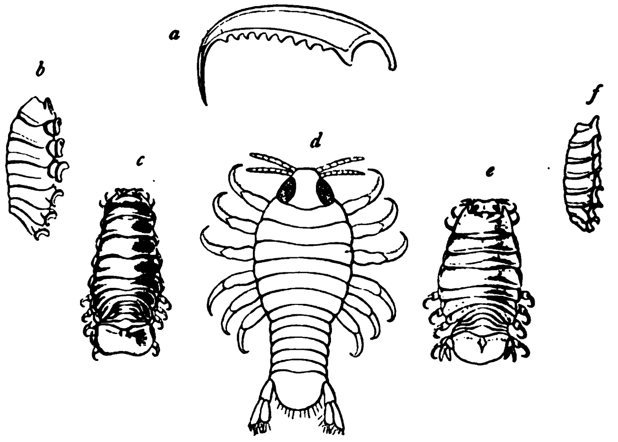

FIG. 259.—CYMOTHOA EXCISA (AFTER SCHIŒDTE AND MEINERT). *a*, UNGULA OF THE LEG OF THIRD PAIR OF YOUNG OF SECOND STAGE (ENLARGED). *b*, LATERAL VIEW OF THORAX OF ADULT FEMALE (REDUCED). *c*, ADULT FEMALE (REDUCED). *d*, YOUNG OF SECOND STAGE (ENLARGED). *e*, ADULT MALE (ENLARGED). *f*, LATERAL VIEW OF THORAX OF ADULT MALE (ENLARGED).

Parasite of chub (from lip); in the gills of a sparid ("*Sparus*" sp. Schiœdte and Meinert).

Body oblong-ovate, nearly twice as long as wide, 12 mm.: 23 mm.

Head a little wider than long, 3 mm.: 4 mm., and deeply set in the first thoracic segment, the narrow, acute antero-lateral angles of which extend half the length of the head. The antero-lateral angles of the head are rounded and curve slightly upward, the anterior portion of the head between them and a little anterior to them curving downward, so that in a dorsal view the anterior margin seems slightly excavate. The eyes are very indistinct, and have almost disappeared; traces of them are seen on the lateral margins, halfway between the anterior and the posterior margins. The first pair of antennæ are composed of eight articles and extend almost to the posterior margin of the head. The basal articles of the first pair of antennæ are widely separated by a distance equal to 2 mm. The second antennæ are composed of nine articles, and extend three articles beyond the first pair of antennæ. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

The first segment of the thorax is about one and a half times longer than any of the three following segments, which are subequal. The fifth and sixth segments are each about half as long as any of the three preceding segments in the median dorsal line. The seventh segment is about half as long as the sixth. The epimera are distinctly separated on all the segments with the exception of the first; they are narrow, elongate plates, which in the second, third, and fourth segments extend a little more than two-thirds the length of the segment, in the fifth extend almost to the post-lateral angles of the segment, and in the last two extend quite to the extremity of the post-lateral angles.

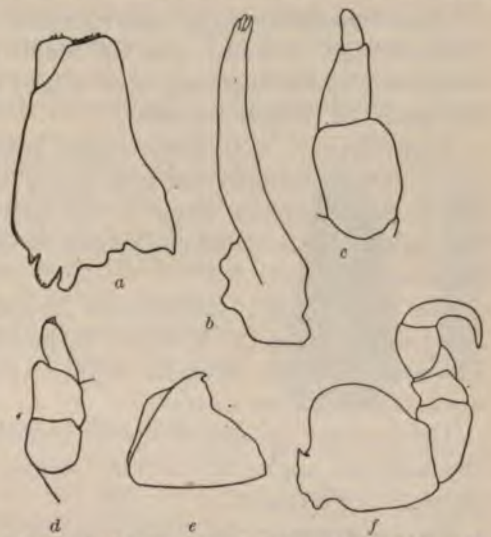

FIG. 260.—CYMOTHOA EXCISA. *a*, SECOND MAXILLA. × 39. *b*, FIRST MAXILLA. × 39. *c*, PALP OF MANDIBLE. × 39. *d*, MAXILLIPED. × 39. *e*, MANDIBLE. × 39. *f*, SEVENTH LEG. × 7.

The abdomen is deeply set in the thorax, the post-lateral angles of the seventh thoracic segment reaching to the anterior portion of the sixth abdominal segment. All the segments of the abdomen are distinct. The first is abruptly very narrow; the others gradually increase in width to the last. The terminal segment is twice as wide as long, 4½ mm. : 9 mm. The post-lateral angles are widely rounded and the posterior margin slightly excavate in the middle. The uropoda are short, extending a little beyond the median transverse line of the terminal abdominal segment. The outer branch is a little longer than the inner branch. Both are similar in shape, and terminate in narrow, rounded extremities.

All the legs are prehensile, terminating in long, narrow curved dactyli. There is a high carina on the exterior margin of the basis of the last four pairs of legs; the height of the carina increases from the fourth to the seventh, where it is extremely high.[a]

CYMOTHOA EXIGUA[b] Schiœdte and Meinert.

Cymothoa exigua SCHIŒDTE and MEINERT, Naturh. Tidsskrift (3), XIV, 1883–84, pp. 232–234, pl. VI, figs. 7–8.

Localities.—Panama; also Charles Island, between the Galapagos Islands.

Found in the mouth of *Citharichthys sordida.*

Body ovate, rather compressed, more than twice as long as wide (9:4).

Head moderately large, subtriangular, widely rounded in front, two or three times narrower than the fourth thoracic segment (almost 2:5), manifestly wider than long (almost 7:6), a little immersed, frontal margin incurved, widely rounded.

Eyes distinct, moderately large, subtriangular or subrectangular. First pair of antennæ smooth, rather stout, extending with the last article to the anterior angle of the first segment of the thorax, or to the eighth article of the second pair of antennæ; they are composed of eight articles.

The second pair of antennæ are smooth, or rather compressed, much more slender than the first pair of antennæ, and extend with the two last articles to the anterior angle of the first thoracic segment; they are composed of nine articles.

The anterior margin of the first thoracic segment is straight, with the anterior angles short and obtusely rounded; the sides of the segment are straight.

The posterior angles of the anterior thoracic segments are rounded, those of the posterior ones truncately rounded.

The epimera are incurved and rather long; those of the first and second pairs are rather narrow, posteriorly a little dilated, obliquely and rounded truncate; those of the third and fourth segments are rather narrow, posteriorly a little narrower, obliquely and widely rounded; those of the fifth and sixth pairs are rather wider, posteriorly very much narrower (but little narrower in the young female), and obliquely and widely rounded. The epimera of the first, second, and third pairs do not reach by a great and gradually increasing distance the posterior angle of the segment; those of the fourth pair do not reach by a small

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[a] For the description of the male, female, and the young of the first and second stages, see Schiœdte and Meinert, Nat. Tidsskr. (3), XIV, 1883–84, pp. 238–244.

[b] This species is included because the fish on which it is parasitic is found as far north as the coast of California.

distance the posterior angle of the segment; those of the fifth pair almost reach the posterior angle of the segment; those of the sixth pair extend a small distance beyond the posterior angle of the segment.

The legs of the first three pairs are shorter than the others; those of the last four pairs gradually but slightly increase in length. The ungulæ are long, rather stout, less curved and subequal in length. The carina of the four posterior pairs is high, gradually and greatly increasing in height, the exterior angle being rounded, the posterior margin more or less widely rounded.

The abdomen is deeply immersed (less deeply immersed in the young female), the inferior angles of the first segment being covered, the sides of the second, third, fourth, and fifth segments together being a little sinuated, manifestly divergent; the abdomen is obscurely bisulcate, much wider than long (almost 5: 4), two or three times shorter than the thorax with the head (almost 2: 5). The first segment is covered for the greatest part; the second, third, and fourth segments are subequal in length or gradually increasing a little, manifestly shorter than the fifth segment. The posterior margin of the first five segments is widely sinuated, and produced at the sides in an obtuse lobe. The superior angles of the second, third, fourth, and fifth segments are almost vanishing. The inferior angles of the second, third, and fourth segments are produced, rather acute, and decrease gradually in length; those of the fifth segment are produced and obtusely rounded.

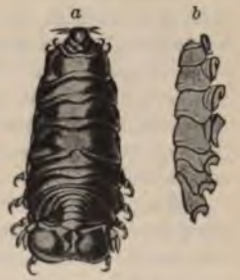

FIG. 261.—CYMOTHOA EXIGUA (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, LATERAL VIEW OF THORAX. (BOTH ENLARGED.)

The terminal segment is transverse, with the sides rounded, the posterior margin widely sinuated, depressed at the base in the middle, obscurely pitted, much wider than the fifth abdominal segment, more than twice as wide as long (7:3), and a little longer than the other abdominal segments together. The uropoda are equal in length to the terminal segment of the abdomen; the inner branch is much shorter and a little narrower than the outer branch, becoming a little narrower and narrowly rounded; the outer branch is sickle shaped and posteriorly narrowly rounded.

Length of adult female 20 mm.

Length of young female 15.5 mm. Color yellow, sprinkled with minute obscure spots, the spots on the head confluent in a transverse row, those of the thorax confluent in a median area, with oblong waxen spots remaining.[a]

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[a] The above description is adapted from the following one of Schiœdte and Meinert's: Producte obovata, compressiuscula, plus duplo longior quam latior (9:4). Caput mediocre, subtrigonum, ante late rotundatum, quam annulus quartus trunci bis vel

CYMOTHOA CARAIBICA Bovallius.

Cymothoa caraibica Bovallius, Bihang till k. Sv. Vet.-Akad. Handl., X, No. 11, 1885, pp. 27–29, pl. v, figs. 58–61.

Locality.—South coast of Hayti, West Indies.

"The head is large and long, only a little shorter than broad, the front margin forms no border on the under-side, but is only bent

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ter angustius (fere 2:5), manifesto latius quam longius (fere 7:6), paulum immersum, fronte ante incurva, late rotundata.

Oculi manifesti, mediocres, subtrigoni, vel subrectanguli.

Antennæ primi paris subteretes, crassiusculæ, angulum priorem annuli primi trunci articulo ultimo superantes, articulum octavum antennarum secundi paris explentes; 8-articulatæ.

Antennæ secundi paris subteretes vel compressiusculæ, quam antennæ primi paris multo tenuiores, angulum priorem annuli primi trunci articulis binis ultimis superantes; 9-articulatæ.

Margo anticus annuli primi trunci subrectus, angulis prioribus brevibus, rotundate obtusis; latera annuli subrecta.

Anguli postici annulorum priorum trunci rotundati, posteriorum rotundate truncati-

Epimera incurva vel subincurva, longiuscula; paris primi et secundi angustiuscula, post paulum dilatata, in obliquum rotundate truncata; paris tertii et quarti angustiuscula, post paulum angustata, in obliquum late rotundata; paris quinti et sexti latiuscula, post valde vel vix (virgini) angustata, in obliquum late rotundata. Epimera paris primi, secundi, tertii angulum annuli spatio magno, per paria sensim crescente, non attingentia; paris quarti angulum annuli spatio parvo non attingentia; paris quinti angulum annuli fere explentia; paris sexti angulum annuli spatio parvo superantia.

Pedes parium trium priorum ceteris breviores; parium quattuor posteriorum per paria sensim longitudine vix crescentes. Ungulæ longæ, crassiusculæ, minus curvatæ, longitudine subæquales. Carina pedum parium quattuor posteriorum alta, per paria sensim valde crescens, angulo exteriore rotundato, margine postico plus vel minus late rotundato. Cauda profunde vel minus profunde (virgini) immersa, angulis inferioribus annuli primi obtectis, lateribus annuli secundi, tertii, quarti, quinti, conjunctim paulum sinuatis, manifesto divergentibus: obscure bisulcata, multo latior quam longior (fere 5:4), quam truncus cum capite bis vel ter brevior (fere 2:5). Annulus primus maximam partem obtectus; annulus secundus, tertius, quartus longitudine subæquales vel sensim paulum crescentes, quam annulus quintus manifesto breviores.

Margo posticus annulorum quinque priorum late sinuatus, ad latera in lobum obtusum productus. Anguli superiores annuli secundi, tertii, quarti, quinque fere evanidi. Anguli inferiores annuli secundi, tertii, quarti producti, acutiusculi, per paria sensim longitudine decrescentes; annuli quinti prominuli, rotundate obtusi.

Annulus analis transversus, lateribus rotundatis, margine postico late sinuato, ad basin in medio impressus, obscure foveolatus, quam annulus quintus caudalis multo latior, plus duplo latior quam longior (7:3), annulis ceteris caudalibus conjunctis paulo longior. Pedes anales annulum analem longitudine subæquantes; ramus interior quam exterior multo brevior et paulo angustior, paulum angustatus, breviter rotundatus; ramus exterior subfalcatus, post breviter rotundatus.

Long. feminæ ovigeræ 20 mm. Long. virginis 15.5 mm. Color cereus, maculis minutis, obscuris sparsus, maculis in strigam transversam capitis et in plagam mediam, maculis oblongis cereis relictis, trunci confluentibus.—Schiœdte and Meinert, Nat. Tidsskr. (3), XIV, 1883–84, pp. 232–233.

downward in the middle; the anterior margin is rounded, the upper side slightly convex.

"The eyes are of median size, placed a little behind the middle of the head near the lateral margins.

"The first pair of antennæ are thick and robust, eight-jointed, without distinction between the peduncle and the flagellum, the last joints without hairs or spines. The second pair of antennæ are considerably more slender, a little shorter, eight-jointed. The processes of the first segment of the pereion are shorter and narrower than in *Cymothoa elegans*, rounded at the ends. The anterior margin of the first segment is slightly emarginate; it is longer than the fourth segment (5:4), and only a little narrower than the fifth (5:6). From the fifth to the seventh, the segments decrease in length, but scarcely in breadth. The seventh segment is longer than half the sixth. The three first segments together are as long as the four last ones together.

"The epimerals of the second and third segments are fixed along the whole length of the segments, the following ones only along half or two-thirds of the length of the corresponding segments; all the epimerals are equal in length to their corresponding segments.

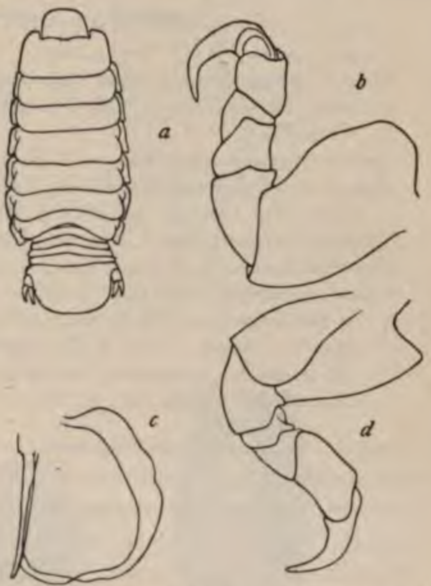

FIG. 262.—CYMOTHOA CARAIBICA (AFTER BOVALLIUS). *a*, DORSAL VIEW OF MALE. × $\frac{5}{2}$. *b*, SEVENTH LEG OF RIGHT SIDE. × 12. *c*, FOURTH LEG OF RIGHT SIDE. × 12. *d*, SECOND PLEOPOD. × 12.

"The first three pairs of pereiopoda have long, strong dactyli, as long as the dactyli of the following pairs. The last four pairs have strongly developed carinæ on the femora. The femur of the seventh pair is longer than broad (24:17).

"The pleon is broad, much broader at the base than long (5:3). The first segment is almost totally hidden, the pleon being a little more immersed than in *Cymothoa elegans*. The last is broadest and longest, the three preceding being equal in length. The second pair of pleopoda carry very long styliform processes.

"The urus is as long as the pleon, and only a little broader than the last pleonal segment (12:11); it is smooth on its upper side, broadly rounded at its lateral and hinder margins, exactly twice as broad as long. The pleon and urus together are equal in length to half of the pereion without the head.

"The uropoda do not reach to the hinder margin of the urus. The peduncle is shorter than the inner ramus. The inner ramus is longer than the outer.

"Color. Yellowish-white, with smaller and larger brown-red spots on the anterior part of each segment; the posterior part is almost white.

"Length. The female virgo, 17 mm.

"The males, 12, 15, 16 mm."—BOVALLIUS.[a]

CYMOTHOA ŒSTRUM (Linnæus).

Oniscus œstrum LINNÆUS, Syst. Nat., 10th ed., I, 1758, p. 636, No. 2; Fauna suecica., 2d ed., 1761, p. 499, No. 2053; Syst. Nat., 12th ed., I, 1767, Pt. 2, p. 1059, No. 2.

Asellus œstrum OLIVIER, Encycl. Méthod., IV, 1789, p. 253.

Cymothoa œstrum FABRICIUS, Entom. Syst., II, 1798, p. 505, No. 6.—LEACH, Trans. Linn. Soc. London, XI, 1815, p. 372; Dict. Sci. Nat., XII, 1818, p. 352.

Cymothoa dufresnei LEACH, Dict. Sci. Nat., XII, 1818, p. 352.

Cymothoa immersa SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 399–400.

Cymothoa œstrum DESMAREST, Consid. Gén. Crust., 1825, p. 309, pl. XLVII, figs. 6–7.—MIERS, Proc. Zool. Soc., 1877, pp. 671–672.—SCHIŒDTE and MEINERT, Naturh. Tidsskr. (3), XIV, 1883–84, pp. 271–279, pl. VIII, figs. 5–13.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 221; Proc. U. S. Nat. Mus., XXIII, 1901, p. 530.

Localities.—Caribbean Sea and Gulf of Mexico to shores of Virginia; Swan Island; St. Bartholomew; St. Christopher; Jamaica; Guadeloupe; St. Georges, Bermudas; St. Anna, Mexico; Key West, Florida; Curaçao, Venezuela; Peru; Barbados (from stomach of a "redfish").

Parasite of *Caranx latus*, "jackfish" (from branchial cavity); redfish (stomach); in the tongue of Scombroid fishes; from the mouth of *Priacanthus arenatus* and *Trachurops crumenophthalmus;* on *Strombus giganteus.*

Body oblong-ovate, twice as long as wide, 15 mm. : 30 mm.

Head, wider than long, 4 mm. : 6 mm., with the antero-lateral angles rounded and the anterior margin appearing straight from a dorsal view, but actually being somewhat triangularly produced and bent downward over the antennæ. The head is deeply set in the first thoracic segment, the broad and widely rounded antero-lateral angles of which extend to the anterior margin of the head. The eyes are absent, and no traces of them are seen. The first pair of antennæ are composed of eight articles and extend a little beyond the middle of the head. The second pair of antennæ are composed of nine articles and extend two articles beyond the first pair of antennæ. The basal articles of the first pair of antennæ are widely separated, being nearly 2 mm. apart. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

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[a] Bihang till K. Sv. Vet.-Akad. Handl., X, No. 11, 1885, pp. 28–29.

The first segment of the thorax is about twice as long as any of the three following segments, which are subequal. The antero-lateral expansions of the first segment are half as wide as the head, 3 mm. in width, and they are widely rounded at the anterior extremity. The fifth and sixth segments are half as wide in the median longitudinal line as any of the three preceding segments. The seventh segment is a little shorter than the sixth. The epimera are distinctly separated on all the segments with the exception of the first. They are narrow plates, extending or nearly extending the full length of the segments. Those of the second segment are a little broader anteriorly than are the others.

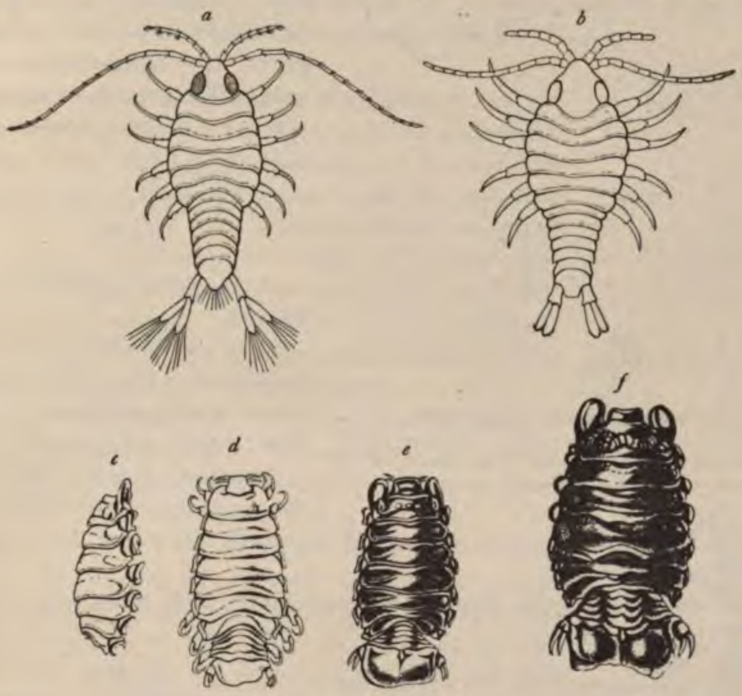

FIG. 263.—CYMOTHOA ŒSTRUM (AFTER SCHIŒDTE AND MEINERT). *a*, YOUNG OF THE SECOND STAGE (ENLARGED). *b*, YOUNG OF THE FIRST STAGE (ENLARGED). *c*, LATERAL VIEW OF THORAX OF ADULT FEMALE (REDUCED). *d*, ADULT MALE (ENLARGED). *e*, ADULT FEMALE (REDUCED). *f*, ADULT FEMALE (REDUCED).

The abdomen is deeply set in the thorax. All the segments are distinct, the lateral parts of the first two being covered by the seventh thoracic segment, so that these segments appear abruptly narrower than the thorax. The following segments gradually increase in width. The sixth or terminal segment is twice as broad as long, 6 mm.: 12

mm. The post-lateral angles are rounded, and the posterior margin is slightly excavate in the middle. The uropoda are as long as the terminal abdominal segment. The outer branch is slightly shorter than the inner branch. Both are equal in width, and narrow, with extremities rounded.

The legs are all prehensile, with short, stout, curved dactyli. There is a high carina on the basis of the last four pairs, the carina increasing gradually from the fourth to the seventh pair, where it is extremely high.[a]

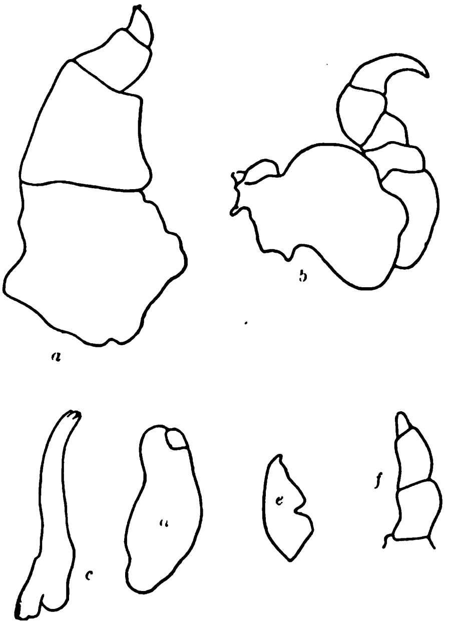

FIG. 264.—CYMOTHOA ŒSTRUM. *a*, MAXILLIPED. × 15½. *b*, SEVENTH LEG. × 4½. *c*, FIRST MAXILLA. × 15½. *d*, SECOND MAXILLA. × 15½. *e*, MANDIBLE. × 15½. *f*, PALP OF MANDIBLE. × 15½.

42. Genus LIVONECA Leach.

Body suboval, more or less twisted.

Head most always deeply immersed. First pair of antennæ widely separated at the base, rather compressed.

Anterior margin of the first thoracic segment widely sinuated in the middle, more or less sinuated or incised at the antero-lateral angles.

Abdomen very little immersed, continuous with thorax, not narrower than thorax.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS LIVONECA.

a. Abdomen somewhat immersed in thorax, the sides of the first segment being almost entirely covered by the seventh thoracic segment.
  b. Head quadrate, but little broader at the base than at the anterior end. *Livoneca panamensis* Schiœdte and Meinert
  b′. Head triangular, nearly twice as broad at the base as at the anterior extremity.
    c. Head roundly truncate in form. Terminal segment of abdomen nearly twice as broad as long.................................*Livoneca vulgaris* Stimpson
    c′. Head narrowly rounded in front. Terminal segment of abdomen about as long as broad..................*Livoneca californica* Schiœdte and Meinert
a′. Abdomen not immersed in thorax, the sides of the first segment free.

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[a] For complete description of this form, the male and female and the young of the first and second stages, see Schiœdte and Meinert, Nat. Tidsskr. (3), XIV, 1883-84, pp. 271-278

b. Uropoda much longer than caudal segment; inner branch narrow, obtuse, much shorter than outer branch. Epimera of last two thoracic segments not longer than segments.......................................*Livoneca redmanni* Leach

b'. Uropoda hardly surpassing the caudal segment; both branches equal in length. Epimera of last two segments of thorax surpassing the segments.
Livoneca ovalis (Say)

LIVONECA PANAMENSIS Schiœdte and Meinert.

Livoneca panamensis SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XIV, 1883-84, pp. 349-353, p. XIII, figs. 11-12.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 830; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 172.

Localities.—Mazatlan; west shores of Central America; Panama.

Body ovate, less than twice as long as wide, 16 mm.: 27 mm.

Head quadrangular, wider than long, 3 mm.: 4 mm., with the anterior margin truncate and about 2 mm. wide. The eyes are small and distinct and situated at the sides of the head near the posterior margin. The first pair of antennæ are separated in front by a distance of 1 mm. They are composed of eight articles, and extend to the posterior margin of the head. The second pair of antennæ are composed of ten articles and extend to the middle of the first thoracic segment.

The first segment of the thorax has the anterolateral angles produced to surround the head, where they extend to the middle of the lateral margin. The first segment is 4 mm. in length. The second and third are subequal and each is 3 mm. long. The fourth and fifth are subequal and each is 2½ mm. in length. The sixth is 2 mm. long. The seventh is 1½ mm. The epimera of all the segments, with the exception of the first, are distinctly separated from the segments. The epimera extend the full length of the lateral margins, with the exception of those of the fifth and sixth segments, which do not quite reach the posterior margins of the segments.

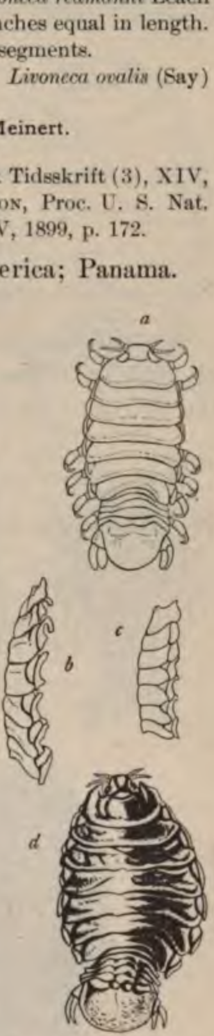

FIG. 265.—LIVONECA PANAMENSIS (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT MALE. *b*, LATERAL VIEW OF THORAX OF ADULT FEMALE. *c*, LATERAL VIEW OF THORAX OF ADULT MALE. *d*, ADULT FEMALE. (ALL ENLARGED.)

The abdomen is slightly immersed or set in the thorax. The first segment is entirely covered by the seventh thoracic segment except in the dorsal portion. All the segments are distinct. The sixth or terminal segment is large, nearly twice as wide as long, 6 mm.: 10 mm., and has the posterior margin irregularly rounded. The uropoda have both branches similar in shape and size and of equal length. They are long and narrow with posterior margins rounded and do not extend quite to the extremity of the terminal abdominal segment.

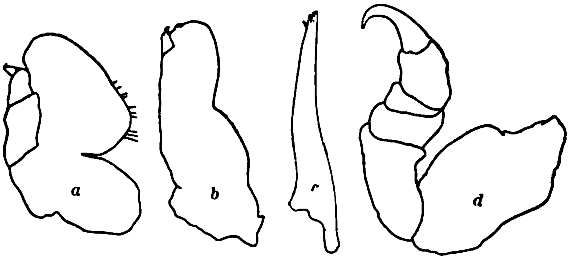

FIG. 266.—LIVONECA PANAMENSIS. *a*, MAXILLIPED OF FEMALE. × 11½. *b*, SECOND MAXILLA. × 20½. *c*, FIRST MAXILLA. × 20½. *d*, SEVENTH LEG. × 7.

The legs are all prehensile. Those of the last four pairs have a high carina on the basis, the carina increasing gradually in height from the fourth to the seventh pair.

LIVONECA VULGARIS
Stimpson.

Livoneca vulgaris STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 508, pl. XXII, fig. 9.—SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XIV, 1883–84, pp. 344–349, pl. XIV, figs. 1–2.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 830; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 172.

Anilocra occidentalis[a] RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 830–831; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 172–174; Amer. Nat., XXXIV, 1900, p. 220.

Livoneca vulgaris RICHARDSON, American Naturalist, XXXIV, 1900, p. 221; Harriman Alaska Expedition, Crust., X, 1904, p. 214; Proc. U. S. Nat. Museum, XXVII, 1904, p. 659.

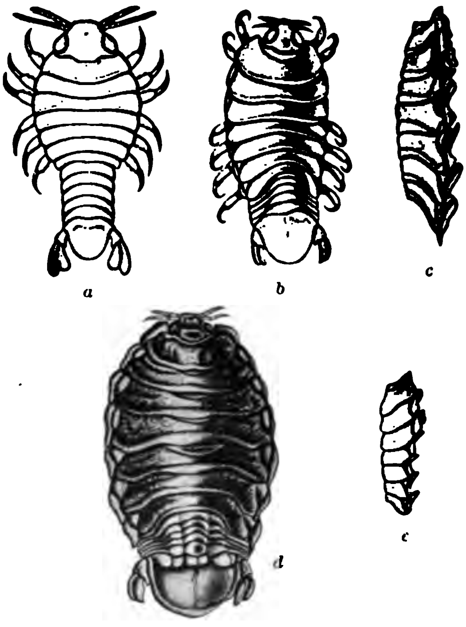

FIG. 267.—LIVONECA VULGARIS (AFTER SCHIŒDTE AND MEINERT). *a*, YOUNG OF THE FIRST STAGE. *b*, ADULT MALE. *c*, LATERAL VIEW OF THORAX OF ADULT FEMALE. *d*, ADULT FEMALE. *e*, LATERAL VIEW OF THORAX OF ADULT MALE. (ALL ENLARGED.)

Localities.—Shores of California, near San Francisco, to Santa Margarita Island, Lower California; San Francisco Bay.

Parasites of the rock cod; of flounder; from Chinese shrimp nets; on *Hyperprosopon argenteus;* in gills of *Steindachneria*, *Ophiodon elongatus*.

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[a] This form is probably the young male of *Livoneca vulgaris*.

Body ovate, not twice as wide as long, 17 mm. : 28 mm., widest at the fourth thoracic segment.

The head is triangular, and at the base is wider than long, 3 mm. : 5 mm.; it is partly set in the first thoracic segment, the antero-lateral angles of which extend to about the middle of the head. The eyes are small, oval, composite, situated in the post-lateral angles of the head, and separated anteriorly by a distance nearly equal to the length of one eye. The posterior margin of the head is rounded; the anterior margin is widely rounded. The anterior end is 2 mm. wide. The first pair of antennæ are composed of eight articles and extend to the end of the sixth article of the second pair of antennæ. The basal articles are not adjacent, being separated by a distance equal to 1 mm. The second pair of antennæ are composed of ten articles, and extend to the middle of the first thoracic segment. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

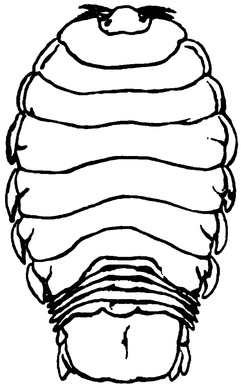
FIG. 268.—LIVONECA VULGARIS (AFTER STIMPSON).

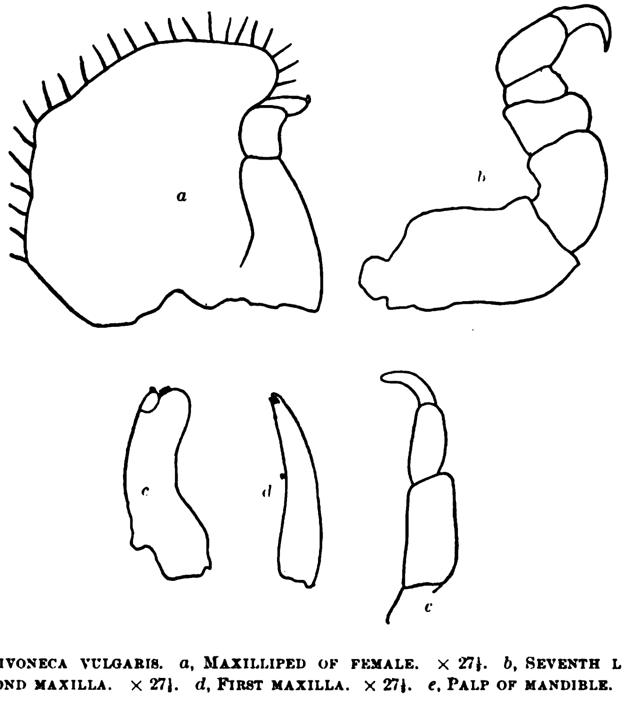

FIG. 269.—LIVONECA VULGARIS. *a*, MAXILLIPED OF FEMALE. × 27½. *b*, SEVENTH LEG. × 9½. *c*, SECOND MAXILLA. × 27½. *d*, FIRST MAXILLA. × 27½. *e*, PALP OF MANDIBLE. × 27½.

The first and fourth segments of the thorax are the longest, each being 3 mm. in length. The second and sixth are each 2 mm. long.

The third and fifth are subequal, each being 2½ mm. in length. The seventh is the shortest, being 1½ mm. long. The epimera are distinctly separated on the last six segments. They are narrow plates, extending the full length of the lateral margins of the segments.

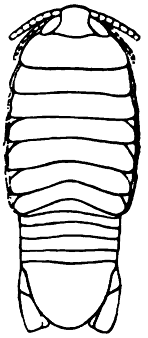

FIG. 270.—LIVONECA VULGARIS. YOUNG MALE.

The abdomen is not narrower than the last thoracic segment. The first segment is covered at the sides by the seventh thoracic segment. The terminal segment is nearly twice as wide as long, 5 mm. : 9 mm. and is widely rounded posteriorly. The uropoda are as long as the terminal segment. Both branches are of equal width and length, and are alike in shape, terminating in rounded extremities.

The legs are all prehensile, and are furnished with long, narrow dactyli. The basis of the last four pairs is produced in a not very high carina.[a]

LIVONECA CALIFORNICA Schiœdte and Meinert.

Livoneca californica SCHIŒDTE and MEINERT, Naturhistorisk Tidsskrift (3), XIV, 1883–84, pp. 372–374, pl. XVI, figs. 1–2.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 829; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 172; Amer. Nat., XXXIV, 1900, p. 221.

Localities.—Shores of California, near San Francisco; Fort Point, San Francisco, California; off Point Nuevo, California; San Pedro, California; South Belmont Oyster Beds, San Francisco Bay, California; Santa Cruz, California.

Parasite of "shiner."

Body oblong-ovate, a little more than twice as long as wide, 7 mm.: 16 mm., and twisted somewhat to one side, the right side being shortened.

The head is as wide at the base as it is long, 2 mm.: 2 mm., and is somewhat triangular, becoming gradually more narrow to an apex which is ½ mm. wide and narrowly rounded. The eyes are large, oval, composite, and situated in the post-lateral angles of the head; they are separated anteriorly by a distance equal to the length of one eye. The posterior margin of the head is rounded. The first pair of antennæ are composed of eight articles. The basal articles are not contiguous, but the distance between them is very small, owing to the narrowness of the anterior part of the head. The second pair of antennæ are composed of eight articles. They extend to the end of the seventh article of the first pair of antennæ and are very slender and feeble. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

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[a] For description of this form, the male, female, and the young of the first stage, see Schiœdte and Meinert, Nat. Tidsskr. (3), XIV, 1883–84, pp. 344–349.

The first segment of the thorax is longest, being 2 mm. in length. The second and third are subequal, each being 1½ mm. long. The fourth, fifth, and sixth are subequal, each being 1 mm. long. The seventh is shortest, being only ½ mm. in length. The head is partly immersed or set in the first thoracic segment, the antero-lateral angles of which extend to about the middle of the head. The epimera are distinctly separated on the last six segments. They are narrow plates, which in the second and third segments do not quite reach the post-lateral angles of the segments. In the last four the epimera extend the full length of the lateral margins of the segments.

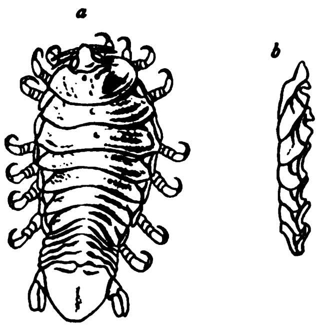

FIG. 271.—LIVONECA CALIFORNICA (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, LATERAL VIEW OF THORAX. (BOTH ENLARGED.)

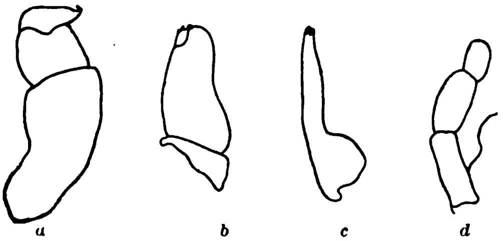

FIG. 272.—LIVONECA CALIFORNICA. *a*, MAXILLIPED. × 33. *b*, SECOND MAXILLA. × 33. *c*, FIRST MAXILLA. × 33. *d*, PALP OF MANDIBLE. × 33.

The abdomen is not narrower than the last thoracic segment. The first segment is partly covered at the sides by the seventh thoracic segment. The terminal segment is rounded posteriorly; it is 4 mm. wide and 3½ mm. long. The uropoda are not longer, but as long as the terminal abdominal segment. The branches are equal in length and width, are alike in shape, terminating in rounded extremities.

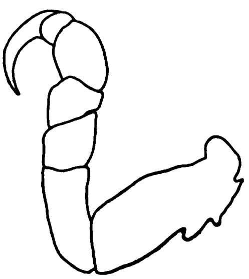

FIG. 273.—LIVONECA CALIFORNICA. SEVENTH LEG. × 11¼.

All the legs are prehensile, being furnished with long, narrow, curved dactyli. There is no carina on the basis of any of the legs.

LIVONECA REDMANNI Leach.

Livoneca redmanni LEACH, Dict. Sci. Nat., XII, 1818, p. 352.
Livoneca desmarestii LEACH, Dict. Sci. Nat., XII, 1818, p. 352.
Livoneca redmanni DESMAREST, Consid. Gén. Crust., 1825, p. 308.
Livoneca desmarestii DESMAREST, Consid. Gén. Crust., 1825, p. 308.
Livoneca redmanni MILNE EDWARDS, Hist. Nat. Crust., III, 1840, p. 261.
Livoneca desmarestii MILNE EDWARDS, Hist. Nat. Crust., III, 1840, p. 261.
Livoneca redmanni MILNE EDWARDS, Cuvier's Règne Anim., pl. LXVI, figs. 4–4a.
Livoneca desmarestii MILNE EDWARDS, Cuvier's Règne Anim., pl. LXVI, figs. 3–3a.
Livoneca redmanni SCHIŒDTE and MEINERT, Naturh. Tidsskr. (3), XIV, 1883–84 pp. 353–358, pl. XIV, figs. 6–12.—RICHARDSON, American Naturalist, XXXIV 1900, p. 221; Proc. U. S. Nat. Mus., XXIII, 1901, p. 531.

Localities.—Cuba; St. Christopher; Jamaica; Bahia and Rio de Janeiro, Brazil.

Parasite of kingfish (on gills).

Body ovate, nearly twice as long as wide, 13 mm.: 25 mm.

Head a little wider than long, 3 mm.: 4 mm.; twice as wide at the posterior end as at the anterior end, with the posterior margin widely rounded, the anterior margin somewhat rounded and deflected downward over the antennæ. The eyes are indistinct and perhaps functionless; they are situated in the post-lateral lobes of the head. The first pair of antennæ are composed of eight articles. The basal articles of each antenna are not adjacent, but are separated by a distance of 1 mm. The second antennæ are composed of ten articles and extend almost to the middle of the first thoracic segment. The maxillipeds have a palp of two articles. The palp of the mandibles is composed of three articles.

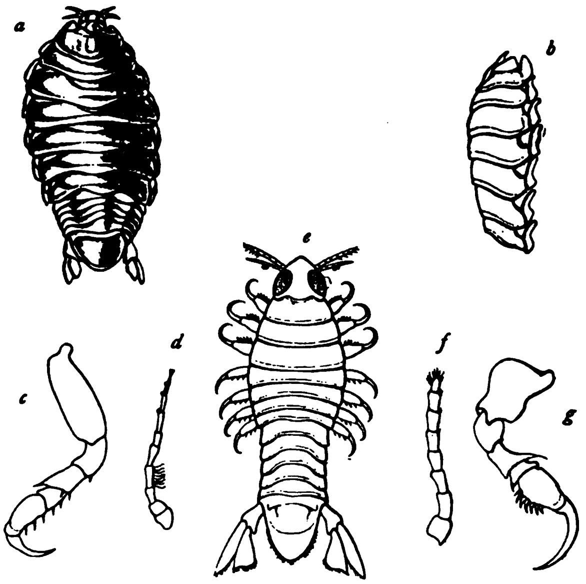

FIG. 274.—LIVONECA REDMANNI (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, LATERAL VIEW OF THORAX OF SAME. *c*, LEG OF SEVENTH PAIR OF YOUNG FEMALE. *d*, ANTENNA OF SECOND PAIR OF SAME. *e*, YOUNG FEMALE. *f*, ANTENNA OF FIRST PAIR OF SAME. *g*, THIRD LEG OF SAME. (ALL ENLARGED.)

The head is but little immersed or set in the first thoracic segment. The antero-lateral angles of the first segment extend one-third the length of the head. The first and fifth segments are a little longer than any of the others, each being 2½ mm. long. The second, third, fourth, and sixth segments are subequal, and each is 2 mm. in length. The seventh segment is shortest, being only 1½ mm. long. The epimera are narrow plates, distinctly separated on the last six segments and extending the full length of the segment.

The abdomen at its base is not abruptly narrower than the thorax. It tapers to a narrower extremity. The first segment is as wide as the seventh thoracic segment and is partly covered by it. The sixth or terminal segment is rounded posteriorly; it is 6 mm. long and 8 mm. wide at the base. The uropoda are much longer than the terminal abdominal segment and extend some distance (2 mm.) beyond its extremity. The outer branch is longer and narrower than the inner branch and has the posterior extremity rounded. The inner branch is broad at its posterior end, which is obliquely truncate, with the outer post-lateral angle produced in a rounded lobe, the inner angle being obtuse.

The legs are all prehensile, with long, curved dactyli. The basis of the last four pairs is produced in a low carina.

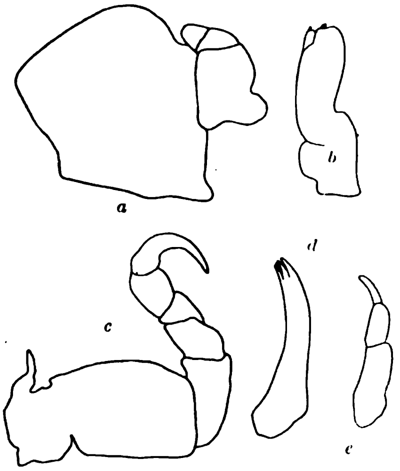

FIG. 275.—LIVONECA REDMANNI. *a*, MAXILLIPED OF FEMALE. × 39. *b*, SECOND MAXILLA. × 20¼. *c*, SEVENTH LEG. × 7. *d*, FIRST MAXILLA. × 39. *e*, PALP OF MANDIBLE. × 20¼.

LIVONECA OVALIS (Say).

Cymothoa ovalis SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 394.

Cymothoa triloba DE KAY, Nat. Hist. New York, Pt. 1, 1843, p. 46, pl. x, fig. 40.

(?) *Cymothoa olivacea* DE KAY, Nat. Hist. New York, Pt. 1, 1843, p. 47, pl. x, figs. 41–41a.

Livoneca ovalis WHITE, Cat. Crust. Brit. Mus., 1847, p. 109.—HARGER, with VERRILL, Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, p. 572 (278), pl. VI, fig. 29.—HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 162; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 395–396, pl. XI, fig. 67.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 222; Proc. U. S. Nat. Mus., XXIII, 1901, p. 531.

Localities.—New Haven, Connecticut; Thimble Islands; Long Island Sound; Woods Hole, Massachusetts; Vineyard Sound; New York; Patapsco River; Bonday's Wharf, Patapsco, Baltimore City, Maryland; Charleston, South Carolina; Pensacola, Florida; St. Marys River, Florida; Mobile, Alabama; Biloxi, Mississippi; Sandy Hook Bay, New Jersey; Hunger's wharf, Virginia; Chesapeake Bay; South Florida; Long Island; Great South Bay, Long Island; Tolchester, Maryland.

Parasite of the blue-fish *Pomatomus saltatrix* (from gills); *Lagodon rhomboides* (under gill cover); saw-fish *Pristis semisagittatus*; scup *Stenotomus chrysops* (on gills); *Trachurops crumenophthalmus* (from gill); trout *Cynoscion regalis?* (on gills); sun fish (on gills); *Micropogon undulatus.*

Body ovate, about one and two-thirds times longer than wide, 13 mm.: 21 mm.

Head as wide as long, 3 mm.: 3 mm., narrower anteriorly than posteriorly with the frontal margin widely rounded. Eyes small, indistinct and situated in the post-lateral angles of the head. Posterior margin of head rounded. The first pair of antennæ are composed of six to seven articles, and extend to the antero-lateral angles of the first thoracic segment, but not to the posterior margin of the head; they are separated in front by a distance equal to 1 mm. The second pair of antennæ are composed of eight to nine articles and extend to the posterior margin of the head. The maxillipeds have a palp of two articles.

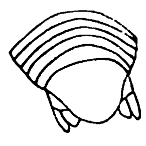

FIG. 276.—LIVONECA OVALIS. ABDOMEN.

The first five segments of the thorax are subequal, each being about 2 mm. in length. The sixth and seventh are subequal, each being a little shorter than any of the preceding segments, and each about 1½ mm. long. The epimera are distinctly separated on all the segments with the exception of the first; they occupy the entire lateral margin in the second, third, fourth, and fifth segments. In the sixth and seventh segments the posterior extremities are produced beyond the posterior margins of the segments, a distance of 1 mm. in the seventh segment.

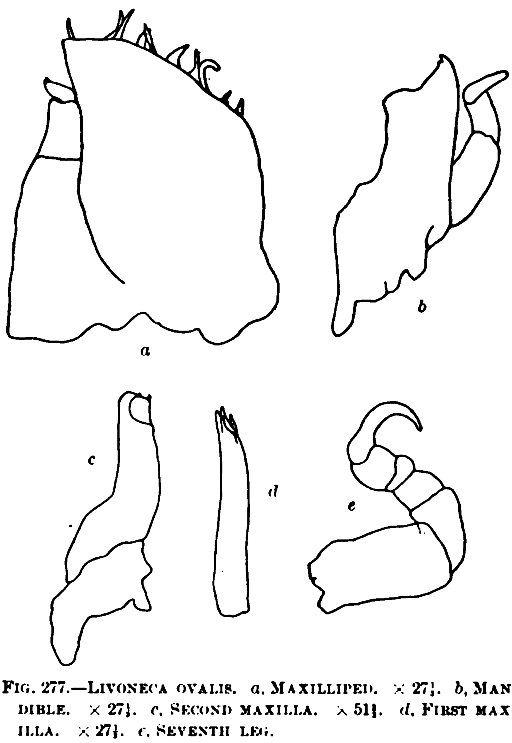

FIG. 277.—LIVONECA OVALIS. *a*, MAXILLIPED. × 27½. *b*, MANDIBLE. × 27½. *c*, SECOND MAXILLA. × 51½. *d*, FIRST MAXILLA. × 27½. *e*, SEVENTH LEG.

All six segments of the abdomen are distinct. The abdomen is not immersed or set in the thorax, and is not abruptly narrower than the thorax, the first segment of the abdomen being as wide as the seventh thoracic segment. The segments gradually decrease in width. The sixth or terminal segment is rounded posteriorly. It is 4½ mm. long and 5 mm. wide at the base. The uropoda do not reach the extremity of the terminal abdominal segment. Both branches are equal in length and similar in shape. The outer branch is about half as wide as the inner branch. The branches are of equal width throughout their length; the outer branch is rounded posteriorly; the inner branch is obliquely truncate, with post-lateral angles rounded.

The legs are all prehensile with long curved dactyli. There is no carina on the basis of any of the legs.

The color is brown, with a transverse band of yellow along the posterior margins of all the segments. The epimera are also yellow.

43. Genus IRONA Schiœdte and Meinert.[a]

Body oval. Head deeply immersed.

First pair of antennæ widely separated at the base, rather compressed.

The anterior margin of the first thoracic segment widely sinuated, the antero-lateral angles short. First thoracic segment manifestly longer than the second. Anterior epimera rather long and narrow, gradually increasing in width; the posterior ones rather short and rather wide.

Body of female asymmetrical; that of male more symmetrical.

Abdomen continuous with thorax, not narrower than thorax; deeply immersed. Carina on the four posterior pairs of legs almost absent.

IRONA NANA Schiœdte and Meinert.

Irona nana Schiœdte and Meinert (3), XIV, 1883–84, pp. 390–395, pl. xvii, figs. 6–11.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 531.

Localities.—Caribbean Sea and Atlantic Ocean; St. John; St. Bartholomew; Rio Janeiro; Harrington Sound, Bermudas (collected by Doctor Linton).

Found parasitic in gills of *Hemirhamphus* sp.; on *Atherina* sp.; on *Atherina harringtonensis*. Doctor Linton says the attachment is voluntary, the parasite frequently leaving the host when disturbed.

Body subovate or ovately produced, very much twisted, rather convex, more than one and a half times or twice as long as wide (5 : 3 or 2 : 1).

The head is small, subtriangular or subconical, one-third or one-fourth as wide as the fourth segment of the thorax (3 : 1 or 4 : 1), much wider than long (5 : 4), deeply immersed, with the front bent downward and narrowly rounded. The eyes are large and subpentagonal.

The first pair of antennæ are rather compressed, rather stout, widely separated, reaching with the fifth article the anterior angle of the first

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[a] See Schiœdte and Meinert for characters of genus, Nat. Tidsskr. (3), XIV, 1883–84, pp. 381–383.

thoracic segment, scarcely as long as the second pair of antennæ; they are composed of eight articles. The second pair of antennæ are subfiliform, one-half as wide as the first pair of antennæ, almost reaching with the sixth article the anterior angle of the first thoracic segment; they are composed of nine articles.

The anterior margin of the first thoracic segment is very widely sinuated, the angles being produced and narrowly rounded and rather obtuse; the sides of the segment are not constricted, but are widely rounded.

The posterior angles of the anterior segments of the thorax are very widely rounded, those of the posterior segments are subrotund.

The epimera are usually unequally produced; the first three are rather long, rather narrow, and posteriorly narrowly rounded; the three posterior ones are rather short or short, rather wide or wide, gradually increasing in width, posteriorly truncate or truncately rounded. The three anterior epimera do not reach by a greater or less distance the posterior angle of the segment, and gradually decrease in length; the three posterior epimera almost reach the posterior angle of the segment.

The legs are rather short, gradually increasing in length; the first three pairs together are very divergent; the four posterior pairs are scarcely convergent, incurved on one side. The ungulæ are rather long or long, rather stout or stout, those of the first five pairs gradually increasing in length and strength; those of the sixth and seventh pairs are a little shorter and more slender than the preceding ones and are less curved. The carina of the four posterior pairs of legs is vanishing.

The abdomen is deeply immersed, the sides of the first three segments, at least on one side, being covered; the sides of the second, third, fourth, and fifth segments together are slightly curved, scarcely converging; the abdomen is rather convex, a little or scarcely wider than long, less than half as long as the thorax with the head. A large part or the greater part of the first segment is covered; the second, third, and fourth segments are subequal in length, almost one and a half times shorter than the fifth segment. The posterior margin of the first four segments are very widely sinuated; that of the fifth segment is straight, obscurely flexuous. The posterior angles of the second, third, fourth, and fifth segments are produced, entire, and narrowly rounded.

The terminal segment is narrowly subtriangular, a little narrower than the fifth segment, almost one and a half times wider than long (almost 5:7), one and a half times longer than the other segments of the abdomen together. The uropoda are a little longer than the terminal segment of the abdomen; the inner branch is almost one and a half times shorter and a little narrower than the outer branch, and is laminar in shape; the outer branch is sickle-shaped, rather acute, and lightly flexuous.

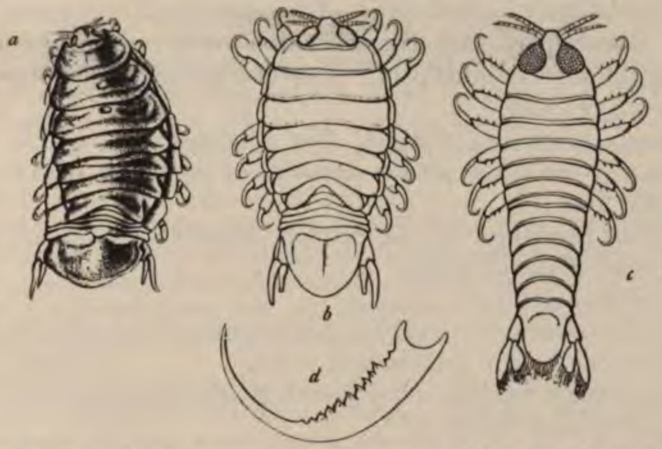

FIG. 278.—IRONA NANA (AFTER SCHIŒDTE AND MEINERT). *a*, ADULT FEMALE. *b*, YOUNG MALE. *c*, YOUNG OF THE SECOND STAGE. *d*, UNGULA OF THE LEG OF THE THIRD PAIR OF SAME. (ALL ENLARGED.)

Length, 8–18 mm.

Color yellow, with large or small dark, branching spots, arranged in transverse series, scattered over the middle of the body; the eyes are black.[a]

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[a] The above description is adapted from the following one of Schiœdte and Meinert's: Subovata vel producte obovata, valde contorta, convexiuscula, plus sesqui vel duplo longior quam latior (5 : 3 vel 2 : 1).

Caput parvum, subtrigonum vel subconicum, quam annulus quartus trunci ter vel quarter angustius (3 : 1 vel 4 : 1), multo latius quam longius (5 : 4), profunde immersum, fronte declivi, breviter rotundata. Oculi magni, subpentagoni. Antennæ primi paris compressiusculæ, crassiusculæ, late distantes, angulum priorem annuli primi trunci articulo quinto attingentes, antennas secundi paris vix complentes; 8-articulatæ.

Antennæ secundi paris subfiliformes, quam antennæ primi paris duplo tenuiores angulum priorem annuli primi trunci articulo sexto fere attingentes; 9-articulatæ. Margo anticus annuli primi trunci latissime sinuatus, angulis prominulis, rotundate angustatis, obtusiusculis; latera annuli non constricta, late rotundata.

Anguli postici annulorum priorum trunci latissime rotundati, posteriorum subrotundati.

Epimera in æquum fere porrecta; terna priora longiuscula, angustiuscula, post breviter rotundata; terna posteriora breviuscula vel brevia, latiuscula vel lata, per paria sensim latitudine crescentia, post truncata vel rotundate truncata. Epimera terna priora angulum annuli spatio majore vel minore, per paria sensim longitudine decrescente, non attingentia; terna posteriora angulum annuli fere explentia. Pedes breviusculi, per paria sensim longitudine crescentes; parium trium priorum conjunctim valde divergentes; parium quattuor posteriorum conjunctim vix convergentes, in latere altero incurvi. Ungulæ longiusculæ vel longæ, crassiusculæ vel crassæ,

Family X. LIMNORIIDÆ.[a]

Body oblong, subdepressed, contractile into a ball. Head short and blunt in front. Both pairs of antennæ small, subequal; flagella short. Mouth parts normal. Mandibles without molar expansion; with a small, three-jointed palp. Palp of maxillipeds composed of five articles. Eyes lateral.

Segments of thorax distinct; first segment longer than second. Epimera well defined on all the segments of the thorax with the exception of the first.

Abdomen composed of six distinct segments; terminal segment large, broad, flattened above.

Legs all ambulatory.

Pleopods uniform in structure, both natatory and branchial; inner plate of second pair in male with a stylet.

Uropoda small, lateral; outer branch short, unguiform, almost obsolete; inner branch linear.

44. Genus LIMNORIA Leach.

Only genus. With characters of family.

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parium quinque priorum per paria sensim longitudine et robore crescentes, paris sexti et septimi præcedentibus paulo breviores atque tenuiores, minus curvatæ. Carina pedum parium quattuor posteriorum evanida.

Cauda profunde immersa, lateribus annulorum trium priorum, saltem alterius lateris, obtectis, annuli secundi, tertii, quarti, quinti conjunctim leviter curvatis, vix convergentibus: convexiuscula, paulo vel vix latior quam longior, quam truncus cum capite plus duplo brevior. Annulus primus magnam vel maximam partem obtectus; annulus secundus, tertius, quartus longitudine subæquales, quam annulus quintus fere sesqui breviores. Margo posticus annulorum quattuor priorum latissime sinuatus; annuli quinti subrectus, obscure flexuosus. Anguli postici annuli secundi, tertii, quarti, quinti prominuli, integri, breviter rotundati. Annulus analis breviter subtriangulus, quam annulus quintus caudalis paulo angustior, sesqui ferme latior quam longior (fere 5:7), annulis ceteris caudalibus conjunctis sesqui longior. Pedes anales quam annulus analis paulo longiores; ramus interior quam exterior fere sesqui brevior et paulo angustior, producte laminatus; ramus exterior subfalcatus, acutiusculus, leviter flexuosus. Long. 8–18 mm.

Color cereus, maculis majoribus vel minoribus, fuscis, racemosis, in series transversas digestis, in medio corpore sparsus; oculi nigri.—Schiœdte and Meinert, Nat. Nat. Tidsskr. (3), XIV, 1883–84, pp. 390–395.

For description of the male and the young of the second stage, see same reference, pp. 392–395.

[a] See Sars for characters of family, Crust. of Norway, II, 1899, pp. 74–75.

LIMNORIA LIGNORUM (Rathke).

Cymothoa lignorum Rathke, Skrivt. af Natur. Selsk., V, 1799, p. 101, pl. iii, fig. 14.

Limnoria tenebrans Leach, Edinb. Encycl., VII, 1813, p. 433 (Am. ed., p. 273); Trans. Linn. Soc. London, XI, 1815, p. 37; Dict. Sci. Nat., XII, 1818, p. 353.—Desmarest, Consid. Gén. Crust., 1825, p. 312.—Latreille, Règne Anim., IV, 1829, p. 135.—Edwards, Annot. de Lamarck, V, 1838, p. 276; Hist. Nat. Crust., III, 1840, p. 145.—Gould, Invert. Mass., 1841, pp. 338, 354.—Edwards, Règne Anim. Crust., 1849, p. 197, pl. lxvii, fig. 5.

Limnoria lignorum White, Pop. Hist. Brit. Crust., 1857, p. 227, pl. xii, fig. 5.—Bate, Report Brit. Assoc., 1861, p. 225.

Limnoria uncinata Heller, Verh. k. k. Zool. Bot. Ges. Wien, XVI, 1866, p. 734.

Limnoria lignorum Bate and Westwood, British Sessile-eyed Crust., II, 1868, p. 351.—Norman, Report British Assoc., 1869, p. 288.

Limnoria tenebrans Verrill, Proc. Am. Assoc. Adv. Sci., 1874, p. 367.

· *Limnoria californica* Hewston, Proc. Cal. Acad. Sci., V, 1874, p. 24 (nomen nudum).

Limnoria lignorum Verrill, Am. Jour. Sci., VII, 1874, pp. 133–135; Proc. Am. Assoc., 1874, p. 371.—Harger with Verrill, Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, p. 379 (85), p. 571 (277), pl. vi, fig. 25.—Stebbing, Trans. Devon. Assoc., 1874, p. 8; Ann. Mag. Nat. Hist. (4), XVII, 1876, p. 79.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 161.—Smith, Proc. U. S. Nat. Mus., II, 1879, p. 232, fig. 2.—Harger, Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 373–376 (See Harger for synonymy).—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, pp. 821–822; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 161–162.—Sars, Crust. of Norway, II, 1899, pp. 76–77, pl. xxxi.—Richardson, American Naturalist, XXXIV, 1900, p. 222; Proc. U. S. Nat. Mus., XXIII, 1901, p. 532.

Localities.—From Florida to Halifax and Gulf of St. Lawrence; Pacific Ocean; San Diego, California; also coast of Great Britain; Kielerbucht, Germany; North Sea; Adriatic Sea; coast of Norway; Bering Island; Woods Hole, Massachusetts.

This species is destructive to wood and submerged timber, boring holes which causes its decay.

Body oblong-ovate, twice as long as wide, 1½ mm.: 3 mm.

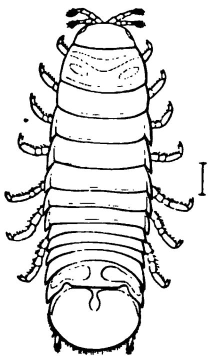

Fig. 279.—Limnoria lignorum (after Harger).

Head wider than long, about twice as wide, with the anterior margin slightly excavate. Eyes small, distinct, and situated at the sides of the head. The first pair of antennæ have the first two articles subequal; the third is a little longer than the second; the fourth or first flagellar article is half as long as the third; the fifth or second flagellar article is minute. The first antennæ extend to the end of the fourth article of the second pair of antennæ. The second pair of antennæ have the first article large; the second is not as long as the first; the third and fourth are subequal and each is about as long as the first; the fifth article is about as long as the fourth. The flagellum is composed of two or three indistinctly defined articles. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

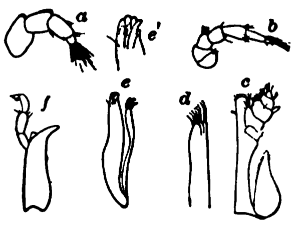

FIG. 280.—LIMNORIA LIGNORUM (AFTER HARGER). *a*, FIRST ANTENNA. × 25. *b*, SECOND ANTENNA. × 25. *c*, MAXILLIPED. × 25. *d*, SECOND MAXILLA. × 25. *e*, FIRST MAXILLA. × 25. *e'*, DISTAL END OF FIRST MAXILLA. × 66. *f*, MANDIBLE. × 25.

The first segment of the thorax is longer than any of those following, which are subequal; it is almost twice as long. Epimera are distinctly separated on all the segments with the exception of the first.

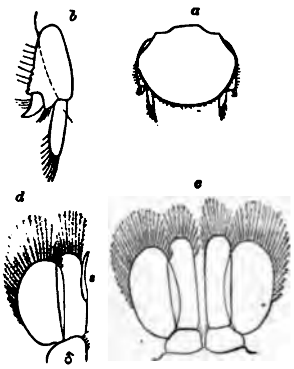

FIG. 281.—LIMNORIA LIGNORUM (AFTER HARGER). *a*, LAST SEGMENT OF ABDOMEN WITH UROPODA. × 10. *b*, UROPOD. × 30. *c*, FIRST PAIR OF PLEOPODA. × 20. *d*, SECOND PLEOPOD OF MALE. × 20.

The abdomen is composed of six distinct segments. The first five are short and subequal. The sixth or terminal segment has the posterior margin widely rounded. The uropoda are laterally placed. The outer branch is small and rudimentary. The inner branch reaches the extremity of the abdomen.

All the legs are ambulatory.

Family XI. SPHÆROMIDÆ.

Body short, oval, convex. Head transverse.

First and second pairs of antennæ multiarticulate with evident distinction into peduncle and flagellum. Mandibles with palps. Anterior segments of abdomen united into a single segment, which, with the large terminal segment, forms a biarticulate abdomen.

Uropoda lateral, forming, with the terminal abdominal segment, a caudal fan. Outer branch of uropoda, when present, movable. Inner branch fixed, immovable.

Epimera united with the thoracic segments.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY SPHÆROMIDÆ.

a. Outer branch of the uropoda entirely wanting.....Genus *Ancinus* Milne Edwards
a'. Both branches of the uropoda present.
  b. Outer branch of the uropoda small, rudimentary....Genus *Cassidisca*, new genus
  b'. Outer branch of the uropoda not rudimentary.
    c. First and second pairs of legs subchelate in male; only first pair subchelate in female.................................Genus *Tecticeps* Richardson
    c'. Legs all ambulatory.
      d. Outer branch of uropoda capable of folding under inner branch; both branches similar in shape and salient.

e. Terminal segment of abdomen entire.
  f. Maxillipeds with second, third, and fourth articles of the palp not produced into lobes.....................Genus *Sphæroma* Latreille 280
  f'. Maxillipeds with second, third, and fourth articles of the palp produced into lobes....................Genus *Exosphæroma* Stebbing 2[illegible]
e'. Terminal segment of abdomen with a median emargination.
  f. Second, third, and fourth articles of palp of maxillipeds produced into lobes...................................Genus *Dynamene* Leach
  f'. Second, third, and fourth articles of palp of maxillipeds not produced into lobes........................Genus *Paradynamene*, new genus
d'. Outer branch of uropoda not capable of folding under inner branch; branches unlike, only outer one salient..........Genus *Cilicæa* Leach

48. Genus ANCINUS Milne Edwards.

Abdomen composed of two segments, the first segment formed by the fusion of several segments.

Outer branch of the uropoda entirely wanting.

First and second pairs of legs subchelate; remaining pairs ambulatory.

ANCINUS DEPRESSUS (Say).

Næsa depressa SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 483–484.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 224; Proc. U. S. Nat. Mus., XXIII, 1901, p. 537.

Locality.—Egg Harbor, New Jersey.

Depth.—Found on surface.

"Body broad, depressed, linear; first caudal segment concealed, second attenuated; anterior feet monodactyle.

"Inhabits Egg Harbor.

"Cabinet of the Academy.

"Body broad, depressed, punctured, sides parallel; segments subequal, anterior ones rather shorter; first segment of the tail not visible, second equal, as long as the three preceding visible ones, attenuated to an obtuse point, which is carinated above and attained by the lateral, spiniform, acute processes; beneath concave, effuse at tip; eyes apparently lunated, but really rounded, with distant granules, and touching the anterior segment of the body; hands of the anterior feet dilated, ovate, thumb as long as the palm, nearly attaining the carpus, tip closing within a prominent spinose tooth on the base of the palm; hands of the second pair cylindric, incurved, with a process dentate at tip and placed at the inner base, armed with an equal incurved thumb not closing on the hand, obtuse, and furnished with a seta at tip; remaining feet ciliated.

"Length half an inch, breadth rather more than one-fifth of an inch.

"Found with the preceding species, common."—SAY.[a]

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[a] Journ. Acad. Nat. Sci. Phila., I, 1818, pp. 483–484.

A single dried specimen of this species, the type, is in the Philadelphia Academy of Natural Sciences.

The body is ovate, about twice as wide as long, 6 mm.: 12 mm.

The head is short and wide, being 1 mm.: 4 mm., with lateral margins and lateral angles rounded. The anterior margin is produced in a linguiform median process extending forward over the basal articles of the first antennæ.

The segments of the thorax are subequal.

The first segment of the abdomen is almost entirely concealed. The second or terminal segment is 4 mm. long and 5 mm. wide at the base. It is triangular in shape, with apex funnel-shaped, the sides being turned downward and inward. The uropoda are single-branched, and are in the form of a long, narrow, tapering branch, posteriorly acute, and extending to the tip of the terminal abdominal segment. This branch seems fixed to the sides of the abdomen, and immovable. There is no trace or indication of an outer branch.

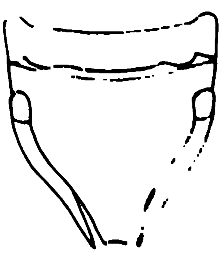
FIG. [illegible].—[illegible] TERMINAL SEGMENT WITH UROPODA. [illegible]

The first pair of antennæ have the first three peduncular articles dilated, and of nearly equal length.

As the dried specimen is glued to a piece of paper, nothing can be ascertained of the structure of the legs.[a]

The specimen was evidently formerly mounted on a pin, as there is a hole in the paper and through the body of the specimen, breaking it at about the middle.

46. Genus CASSIDISCA, new genus.

Body oval, depressed.

Maxillipeds with second, third, and fourth articles of palp not produced into lobes.

Abdomen composed of two segments, the first segment formed by the fusion of several segments.

The inner branch of the uropoda is large and well developed, and is immovable and firmly fixed to the sides of the abdomen. The outer branch is rudimentary and very small, and not [illegible] separated from the [illegible] [illegible] being represented by a small [illegible] in the exterior margin of the inner branch.

Legs ambulatory.

[illegible] Say. [illegible]

This genus differs from *Cassidina*[a] Milne Edwards and *Cassidinella* Whitelegge,[b] in not having the palp of the maxillipeds with the second, third, and fourth articles produced into lobes.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CASSIDISCA.

a. Terminal segment of abdomen smooth. Outer branch of uropoda about one-fourth as long as inner branch. Apex of abdomen truncate. *Cassidisca lunifrons* (Richardson)

a'. Terminal segment of abdomen with three low transverse elevations as the base. Outer branch of uropoda more than one-third but not quite one-half as long as the inner branch. Apex of abdomen triangulate.... *Cassidisca ovalis* (Say)

CASSIDISCA LUNIFRONS (Richardson).

Cassidina lunifrons Richardson, American Naturalist, XXXIV, 1900, p. 222; Proc. U. S. Nat. Mus., XXIII, 1901, p. 533.

Locality.—Great Egg Harbor, New Jersey.

Body oval, surface smooth.

Head broader anteriorly than posteriorly, the antero-lateral angles being produced in a lateral direction and forming very acute angles. The eyes are situated at the post-lateral corners of the head. The first pair of antennæ reach two or three joints beyond the antero-lateral angle of the head; flagellum six-jointed. The second pair almost reach the posterior margin of the first thoracic segment; flagellum consists of about eight joints, the first four being large, the last four small and setose.

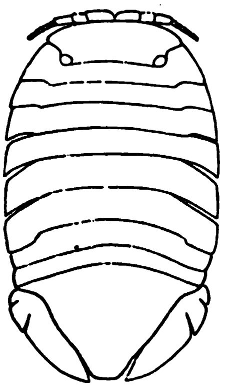

Fig. 283.—Cassidisca lunifrons.

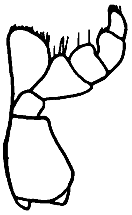

Fig. 284.—Cassidisca lunifrons. Maxilliped. × 77½.

The first thoracic segment is well fitted to the head, so that the elliptical outline of the body is preserved. The segments are subequal, with straight lateral margins. The epimera are not distinct from the segments.

The first segment of the abdomen is short. The terminal segment is subtriangular, with apex truncate. The inner branch of the uropoda is pointed at its extremity, and reaches the tip of the abdomen. The outer branch is rudimentary, about one-fourth as long as the inner branch.

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[a] Gerstaecker (Bronn's Klassen und Ordnungen des Thier-Reichs, V, Pt. 2, Pts. 1, 2, 3, 1881, pl. VI, fig. 12a) figures the maxilliped of *Cassidina typa* Milne Edwards, and shows the second, third, and fourth articles of the palp produced into lobes. Specimens of *Cassidina emarginata* in the collection of the U. S. National Museum have the maxillipeds with the second, third, and fourth articles of the palp also produced into lobes.

[b] Austral. Mus. Mem., IV, 1901, pp. 201-246.

Color, brown.

Specimens were found at Great Egg Harbor, New Jersey, by Dr. William Stimpson.

Type.—Cat. No. 4402, U.S.N.M.

This species is very similar to the following one, and may prove to be the same. As the type and only specimen of Say's species is in such a bad state of preservation, I am unwilling as yet to identify this species with it.

CASSIDISCA OVALIS (Say).

Næsa ovalis SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 484–485.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 224; Proc. U. S. Nat. Mus., XXIII, 1901, p. 537.

Locality.—South Carolina.

Depth.—Found on surface.

"Body oval, depressed; ultimate segment of the tail obtuse, with three hardly raised, very obtuse lines at base; lateral appendices dilated, three caudal segments.

"Inhabits bays and inlets of the United States; common. Cabinet of the Academy.

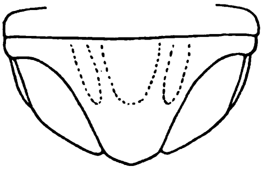

FIG. 285. — CASSIDISCA OVALIS. ABDOMEN WITH UROPODA. × 9½.

"Body perfectly oval, segments subequal, fourth, fifth, and sixth largest, first segment of the tail equal to the preceding one, simple; terminal segment triangular, obtusely rounded at tip, rectilinear each side, half as long as the body, with three longitudinal, abbreviated, raised, very obtuse lines at base, of which the middle one is most conspicuous; lateral processes dilated, depressed, rectilinear within and rounded on the external margin, so as to form with the terminal segment a perfectly semiorbicular termination of the body, without interval; head somewhat unequal; eyes conspicuous, hemispherical; antennæ equal; labrum triangular, advanced, very conspicuous, terminating the head before and forming, with the base of the superior antennæ behind it, a rounded termination without interval, completing the oval form of the body; feet all armed with bifid nails, none of which close on the preceding joint.

"Length less than three-twentieths of an inch.

"This little animal is extremely common in sea water, usually creeping on fuci and other marine plants; we found it as far south as St. Johns River in Florida." SAY.[a]

A dried specimen, mounted on a pin, the type and only specimen of this species is in the Philadelphia Academy of Natural Sciences. The specimen was loaned me for examination.

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[a] Journ. Acad. Nat. Sci. Phila., I, 1818, pp. 484–485.

I have been able to ascertain that the species should be referred to the genus *Cassidisca.* The outer branch of the uropoda is more than one-third as long as the inner branch, and in the dried specimen was rather difficult to find. By carefully scraping off some of the incrusting substance the form of the uropoda was disclosed.

The body is oval, depressed, about 5 mm. in length.

The seven segments of the thorax are distinct; the first three are subequal in length; the three following segments are subequal, and are longer than the three preceding segments; the seventh segment is a little shorter than the sixth segment.

The first segment of the abdomen is short, about as long or perhaps a little shorter than the seventh thoracic segment. The terminal segment is triangular with apex obtusely triangulate. The base of the segment appears to have a large median longitudinal elevation or boss, and a smaller one on either side.

The inner branch of the uropoda is as long as the terminal segment; the inner margin is straight; the outer margin is curved. The outer branch is a little more than one-third the length of the inner branch, and is marked off only by a small incision in the exterior margin of the inner branch. It is separated on the inner margin from the inner branch only by a depressed line. In a fresh specimen the separation might be more complete.

Nothing can be ascertained of the antennæ.

47. Genus TECTICEPS Richardson.

Body oval and somewhat flattened.

Head subquadrangular, broader anteriorly than posteriorly, with its anterior and lateral margins produced, concealing the antennæ. The antennæ, which are entirely hidden, extend backward and lie under the epimeral plates at the sides of the thorax.

The first and second pairs of legs are subchelate in the male; only the first pair are subchelate in the female; the first pair terminate in a large oval hand and finger, bearing a small hook; the second pair in the male terminate in a more irregularly shaped hand. All the other legs are simple in structure.

The terminal segment of the abdomen is triangular and entire, and is pointed at the extremity. The uropoda are double branched and lateral, and resemble closely those of the genus *Sphæroma.*

The second, third, and fourth articles of the palp of the maxillipeds are produced in lobes as in the genus *Exosphæroma.*

ANALYTICAL KEY TO THE SPECIES OF THE GENUS TECTICEPS.

a. First pair of antennæ, with a flagellum of ten articles, extend to the posterior angle of the first thoracic segment. Second pair of antennæ, with a flagellum of twelve articles, extend to the middle of the second thoracic segment. Terminal segment of abdomen acutely pointed. Outer branch of uropoda much longer than inner branch. Eyes placed on the posterior half of the head. Sixth and seventh pairs of legs have the propodus and dactylus very much more elongated than in preceding pairs of legs... *Tecticeps alascensis* Richardson

b. First pair of antennæ, with a flagellum of sixteen articles, extend to the posterior angle of the third thoracic segment. Second pair of antennæ, with a flagellum of thirteen articles, extend to the middle of the fourth thoracic segment. Terminal segment of abdomen posteriorly rounded. Outer branch of uropods equal in length to inner branch. Eyes placed in the middle transverse line of the head. Sixth and seventh pairs of legs with propodus and dactylus only gradually a little longer than those of preceding pairs of legs.
Tecticeps convexus Richardson

TECTICEPS ALASCENSIS Richardson.

Tecticeps alascensis RICHARDSON, Proc. Biol. Soc. Washington, XI, 1897, pp. 181–183; Proc. U. S. Nat. Mus., XXI, 1899, p. 837; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 181; American Naturalist, XXXIV, 1900, p. 223.

Localities.—Alaska; Kamchatka; Off Iturup Island, Kurile Islands, Okhotsk Sea; latitude 60° 16′ north, longitude 167° 41′ west; Bering Sea, west of Pribilof Islands (106 fathoms); between Pinnacle and Ulakhla, Unalaska; Bering Sea, off Nunivak Island.

Depth.—9–106 fathoms.

Found in fine gray sand, pebbles, gravel, shells, black and red sand, green mud, and fine dark volcanic sand.

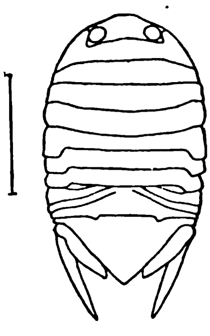

FIG. 286.—TECTICEPS ALASCENSIS. × 2¼.

Outline of body oval. Surface quite smooth, but covered with little points of depression.

Head large; twice as long as any one of the thoracic segments. The anterior margin is produced in a way to conceal the antennæ, as are also the antero-lateral margins, making the anterior portion of the head in front of the eyes much broader than the posterior portion, and forming very acute antero-lateral angles. This frontal margin forms a very broad obtuse angle with its apex in the median line. On either side of this apex to the antero-lateral angle this portion of the head is somewhat depressed. The antennæ are not conspicuous, lying concealed beneath the frontal margin of the head. The first pair extend to the posterior angle of the first thoracic segment; the flagellum consists of ten articles. The second pair reach the middle of the second segment; the flagellum is twelve-jointed. The eyes are dorsally situated on the posterior half of the head.

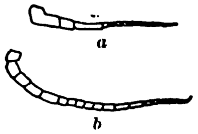

FIG. 287.—TECTICEPS ALASCENSIS. *a*, ANTENNA OF FIRST PAIR. *b*, ANTENNA OF SECOND PAIR. × 5¼.

The thoracic segments are about equal in length. The first one extends laterally around the posterior portion of the head, forming a broad plate at the side of the segment. The epimera of all the segments are about twice as broad as long, with the exception of those of the fifth segment, which are nearly square and very conspicuous.

The first segment of the abdomen has three suture lines, and its posterior margin projects down in two small triangular processes, one on either side, over the terminal segment. The terminal segment is triangular, and has a very pointed extremity. The branches of the uropods differ considerably. The inner one is broad and tapering, and does not reach the tip of the abdomen. The outer one is slender and sharply pointed, and extends beyond the abdomen.

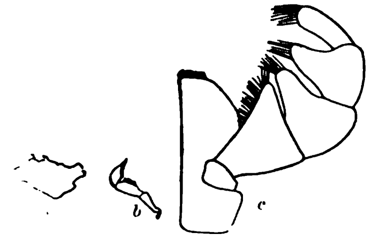

FIG. 288.—TECTICEPS ALASCENSIS. *a*, MANDIBLE. *b*, MANDIBULAR APPENDAGE. × 5⅓. *c*, MAXILLIPED. × 20⅓.

The first pair of legs are subchelate, as are also the second pair in the male. In the first pair the propodus is large and oval in shape, and bears in the palma a row of stiff bristles at regular intervals and pointing obliquely in the same direction, while a thick row of fine cilia, pointing obliquely in the opposite direction, crosses these almost at right angles. The dactylus terminates in a single hook, at the base of which two smaller hooks are situated. In the legs of the second pair the propodus is irregular in shape with an indication of a rudimentary pollex. There are no hairs or bristles in the palma. The legs of the third, fourth, and fifth pairs present nothing unusual in structure, but resemble the ambulatory legs common to this family. In the sixth and seventh pairs the structure is the same as that of the preceding legs of the third, fourth, and fifth pairs, but with an increasing disproportion in the length of the propodus and dactylus. In the seventh pair of legs these joints, but more especially the propodus, attain a size most conspicuous for their length. The propodus becomes over 3½ times longer than the carpus which immediately precedes it.

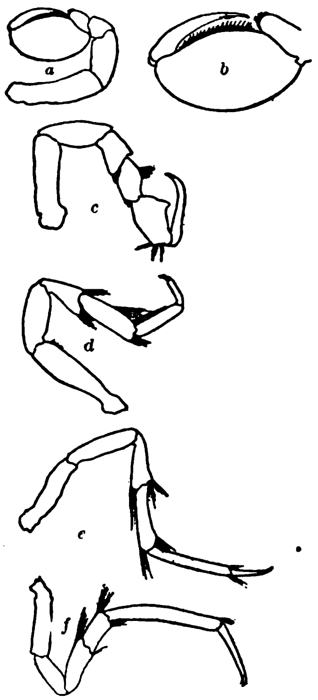

FIG. 289.—TECTICEPS ALASCENSIS. *a*, LEG OF FIRST PAIR. × 5⅓. *b*, LAST TWO JOINTS OF SAME. × 10⅔. *c*, LEG OF SECOND PAIR OF MALE. × 5⅓. *d*, LEG OF THIRD PAIR. × 5⅓. *c*, LEG OF SIXTH PAIR. × 5⅓. *f*, LEG OF SEVENTH PAIR. × 5⅓.

Color.—The color varies from dark brown to yellow, more or less dotted with black. In the darker specimens the epimera and the uropods are almost white, with scattered spots of black. Other specimens are brown with markings of red, and some are bluish-gray in color tinged with brown or orange.

Type.—The type specimen was found at station 3515, latitude 59° 59′ north, longitude 167° 53′ west, at a depth of 13 fathoms. Catalogue No. 20031, U.S.N.M.

Distribution.—This species extends all along the coast of Alaska, having been found at the following stations: Station 3272, north of Amak Island (31 fathoms); station 3297, off Cape Menchikoff (26 fathoms); station 3246, south of Hagemeister Island (17½ fathoms); station 2841, North Head, Akutan Island (56 fathoms); station 3248, off Bristol Bay (21 fathoms); station 3600, Aleutian Islands, off Unimak Island (9 fathoms).

TECTICEPS CONVEXUS Richardson.

Tecticeps convexus RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 837-838; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 181-183; American Naturalist, XXXIV, 1900, p. 223.

Locality.—Monterey Bay, California.

Depth.—30 feet, sandy bottom.

Body oval, somewhat flattened. Surface smooth; color light yellow with markings of brown.

Head with the anterior margin much broader than the posterior margin, produced in front but not wholly concealing the basal joints of the first pair of antennæ, and somewhat raised, forming two small convex elevations. The antero-lateral margin is likewise produced, forming an acute angular projection, which extends in a lateral direction beyond the post-lateral margin of the head. The eyes are dorsally situated in a median transverse line. The first pair of antennæ, with a flagellum of sixteen articles, extend to the posterior angle of the third thoracic segment. The second pair of antennæ, with a flagellum of thirteen articles, extend to the middle of the fourth thoracic segment, and exceed by one joint the length of the first pair of antennæ. Both pairs of antennæ are disposed to lie concealed under the broad epimeral plates of the thoracic segments.

The thoracic segments are subequal in length. The first segment has its antero-lateral angles produced around the anterior portion of the head, forming a broad plate at the side of the segment. The epimera are almost twice as broad as long; those of the fifth segment extend downward, with the anterior margin straight, making the length and breadth about equal, and forming almost square epimera; in the epimera of the sixth and seventh segments the anterior margins are in the same direction as the posterior margins, which extend downward.

The first segment of the abdomen has three suture lines, and its posterior margin is produced in two small points, one on each side of the median line, about equidistant from it and the lateral margin of the segment. The terminal segment is widely rounded posteriorly. The inner branch of the uropoda is of nearly equal width throughout its length and is rounded at its extremity; the outer branch is slender and sharply pointed. Both branches are of nearly equal length and neither extends beyond the tip of the abdomen.

The first pair of legs have the propodus dilated and the dactylus reflexible. The propodus is large and oval in shape. In the legs of the second pair the propodus is irregular in shape, dilated with reflexible dactylus in the male, and simple in the female. The legs of the other five pairs are similar in structure, ambulatory, and show a gradual increase in length.

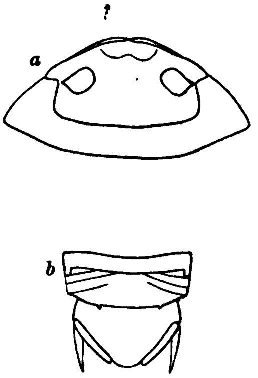

Fig. 290.—Tecticeps convexus. *a*, Head. × 5⅓. *b*, Abdomen and last thoracic segment. × 2⅔.

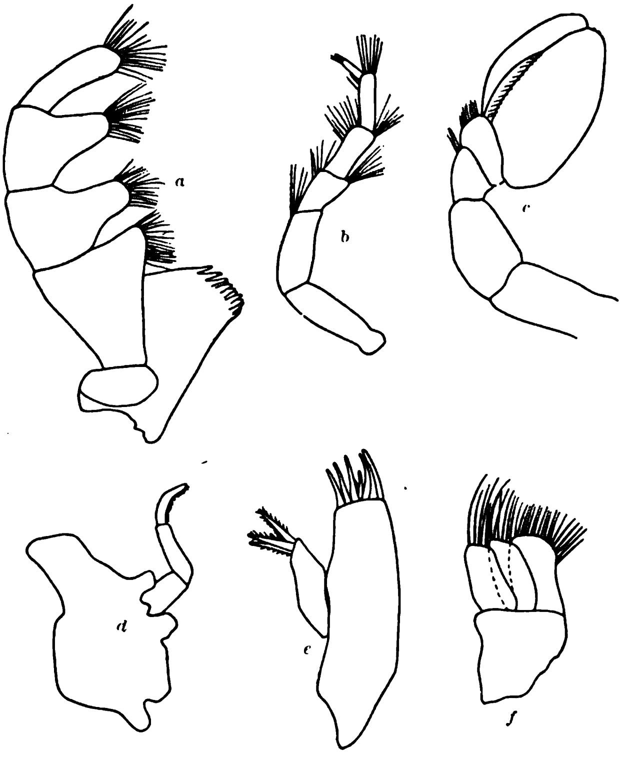

Fig. 291.—Tecticeps convexus. *a*, Maxilliped. × 27½. *b*, Second leg of female. × 27½. *c*, First leg. × 15½. *d*, Mandible. × 15½. *e*, Second maxilla. × 27½. *f*, First maxilla. × 27½.

A number of individuals were found at Monterey Bay, California, and sent to the U. S. National Museum by Mr. Heath, who gives the following note of their habits:

> They were taken by the Chinese fishermen from a sandy sea bottom about 30 feet below the surface (according to the Chinese statement). These are rapid swimmers, and the moment they are disturbed they roll into a ball and project the exopodite of the last free segment. This is undoubtedly for protection. I have not had time to accurately examine the position nor character of this appendage, but its sharp, swordlike nature is readily recognized.

Type.—Cat. No. 22572, U.S.N.M.

This species differs from *T. alascensis* in having longer antennæ and antennulæ; in having the terminal segment rounded, which in that species is very pointed; in having the outer branch of the uropods as short as the inner, which in that species is much longer; in having only a gradual increase in the length of the legs, which in that species show such marked disproportions in the propodus of the sixth and seventh pairs, and in the position of the eyes, which in this species are situated in the median transverse line of the head, while in *T. alascensis* they are placed in the posterior half of the head.

48. Genus SPHÆROMA Latreille.

Body contractile, able to roll into a complete ball. Abdomen composed of two segments, the first of which is formed by the fusion of several coalesced segments. The terminal segment is rounded, entire.

The branches of the uropoda are similar, both being salient. The outer branch of the uropoda is denticulate along the exterior margin; the inner branch is immovable and fixed to the side of the abdomen; the outer branch is movable, and capable of folding under the inner branch.

The second, third, and fourth articles of the palp of the maxillipeds not produced into lobes, but furnished with exceedingly long hairs.

Legs all ambulatory in structure.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS SPHÆROMA.

a. Abdomen without tubercles .... *Sphæroma quadridentatum* Say

a′. Abdomen with tubercles.

  b. Tubercles on terminal segment of abdomen arranged in a transverse row of four on anterior portion. Two tubercles on first abdominal segment, one on either side of the median line. A transverse row of four tubercles, two on either side of the median line on the seventh thoracic segment. Posterior extremity of terminal segment of abdomen without prominent transverse elevation. *Sphæroma destructor* Richardson

  b′. Tubercles on terminal segment of abdomen arranged in two longitudinal series of four, a series on either side of the median line. No tubercles on first segment of abdomen or on seventh thoracic segment. Posterior extremity of terminal segment of abdomen with prominent transverse elevation. *Sphæroma pentodon* Richardson

SPHÆROMA QUADRIDENTATUM Say.

Sphæroma quadridentatum Say, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 400.—Harger, Am. Jour. Sci. (3), V, 1873, p. 314.—Harger with Verrill, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 315 (21); p. 569 (275), pl. v, fig. 21.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 161; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 368-370, pl. ix, fig. 53.—Richardson, American Naturalist, XXXIV, 1900, p. 223; Proc. U. S. Nat. Mus., XXIII, 1901, p. 533.

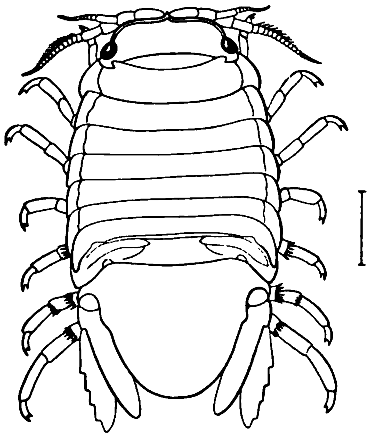

Fig. 292.—Sphæroma quadridentatum (After Harger).

Localities.—New England; Vineyard Sound; Provincetown, Massachusetts; Savin Rock, New Haven; Cape Charles City, Virginia; St. Catherine Island, Georgia; Beaufort, North Carolina; east Florida; Key West, Florida; south Florida.

Depth. — Surface to one-half fathom.

The type locality is St. Catherine Island, Georgia.

Body ovate, nearly twice as long as wide, 5 mm. : 10 mm.

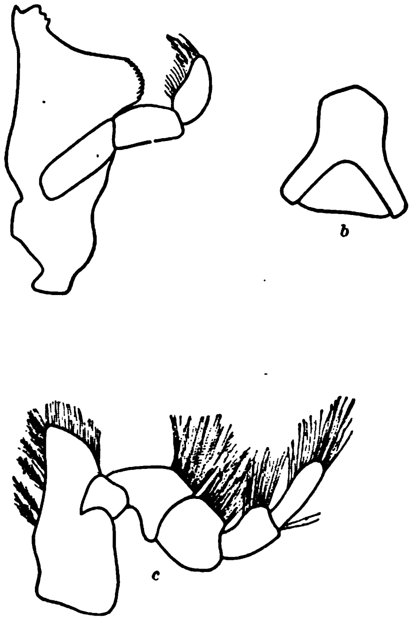

Fig. 293.—Sphæroma quadridentatum. *a*, Mandible. × 41. *b*, Frontal lamina and clypeus. × 23. *c*, Maxilliped. × 41.

Head twice as wide as long, 1½ mm. : 3 mm., with a frontal border arising between the eyes and produced in a small median point. The eyes are small, round, composite, and situated in the postlateral angles of the head. The first pair of antennæ have the basal article elongate; the second article is half as long as the first; the third is twice as long as the second. The flagellum is composed of twelve articles. The first antennæ extend to the middle of the first thoracic segment. The basal article of the second antennæ is inconspicuous; the second is short; the third is twice as long as the second; the fourth and fifth are subequal and each is a little longer than the third. The flagellum is composed of fifteen articles. The second antennæ extend to the posterior margin of the second thoracic segment. The maxilliped has a palp of five articles.

The palp of the mandible is composed of three articles. The frontal lamina is large and conspicuous and has the anterior margin broadly triangulate, the post-lateral angles produced.

The segments of the thorax are about equal in length. The epimera are not distinct from the segments, but the place of coalescence is indicated by a light longitudinal area on either side of the segment. The post-lateral angles of the lateral parts of all the segments is drawn out into a narrow and somewhat acute process, more pronounced in the first four segments.

The abdomen is composed of two segments. The first segment has three suture lines indicating several partly coalesced segments. The terminal segment is long and widely rounded posteriorly. The anterior portion is convex. The fixed inner branch of the uropoda extends a little beyond the extremity of the terminal abdominal segment and has its margins smooth. The outer movable branch is as long and wide as the inner branch and has three or four teeth on its outer margin.

The legs are all ambulatory in character.

SPHÆROMA DESTRUCTOR Richardson.

Sphæroma destructor RICHARDSON, Proc. Biol. Soc. Wash., XI, 1897, pp. 105–107; American Naturalist, XXXIV, 1900, p. 223; Proc. U. S. Nat. Mus., XXIII, 1901, p. 534.

Sphæroma terebrans STEBBING (part), Spolia Zeylanica, II, Pt. 5, 1904, pp. 16–21.

Locality.—St. Johns River, Palatka, Florida. (Fresh water.)

Bores holes in piers on St. Johns River. Sections of the wood show that the diameter had been reduced during a period of eight years from 16 inches to 7½ inches. The whole surface of the wood was bored with holes averaging in size about 5 mm. in diameter, and in an end section the holes were arranged in concentric rings between the rings of annual growth, showing the little animal's preference for the soft pine. Very strong mandibles projecting beyond the labrum most conspicuously provide a perfect equipment for this destructive work.

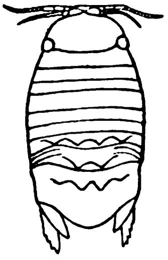
FIG. 294.—SPHÆROMA DESTRUCTOR. DORSAL VIEW. × 3.

Head twice as broad as long, having a small median projection. Eyes lateral and posteriorly situated. The first pair of antennæ, with a flagellum composed of eight articles, reach the posterior margin of the head; the second pair of antennæ extend to the post-lateral angle of the first thoracic segment; its flagellum is twelve jointed.

The first and fourth thoracic segments are of equal length and are one and a half times longer than the other thoracic segments. The epimeral parts are not distinct from the segments, are quite broad, and terminate laterally in acute angles, which point downward. The seventh thoracic segment bears four tubercles situated in a transverse line.

The abdomen is composed of two distinct segments, on the first of which are two tubercles, one on either side of the median line. Suture lines at the sides of this segment indicate three coalesced segments. The terminal segment is triangularly shaped and rounded posteriorly with an upcurved margin, which extends all around the terminal half of the segment. The whole surface of the abdomen is thickly tuberculated with low but distinct tubercles, each one surmounted with a small tuft of stiff hairs or bristles. On the anterior part four large tubercles are situated in a transverse line, the two center ones being somewhat closer to each other than to the lateral ones. The uropoda extend beyond the extremity of the abdomen, the outer branch being the longer. Both are pointed and similar in shape. The outer edge of the exopodite is provided with four teeth, while that of the endopodite is smooth.

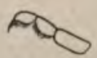

FIG. 295.—SPHÆROMA DESTRUCTOR. MANDIBULAR APPENDAGE. × 10.

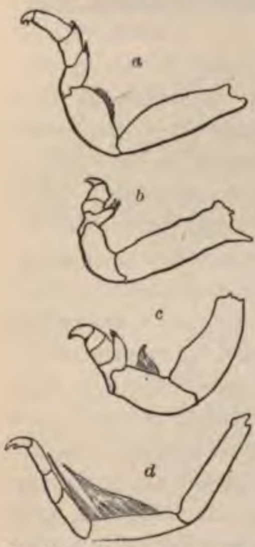

FIG. 296.—SPHÆROMA DESTRUCTOR. × 10. *a*, LEG OF SECOND PAIR. *b*, LEG OF FOURTH PAIR. *c*, LEG OF FIFTH PAIR. *d*, LEG OF SIXTH PAIR.

The legs of this species are in three series, according to structure, the first three pairs being alike, the fourth and fifth similar, and the sixth and seventh similar. The legs of the first series are long and slender (fig. 294 *a*), with the second joint or basis nearly cylindrical in shape. The ischium is nearly as long as the basis, and this joint, as well as the merus, is furnished with long straight hairs. The carpus and propodus are likewise long and slender. In the first pair the carpus is minute. The legs of the second series, the fourth and fifth pairs, are stout and short, being similar in general form, though differing somewhat in relative proportions. The basis is about half the length of the entire leg, while the joints following the ischium are very short. In the third series the legs are nearly as long as those of the first series, but differ in size and shape. They are stouter and not cylindrical.

The whole surface of the body is punctate, and has minute transverse rugæ between the points of depression. In color it is a dark brown, shaded on the edges with a lighter brown.

Type.—Cat No. 19857, U.S.N.M.

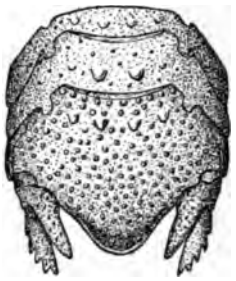

FIG. 297.—SPHÆROMA DESTRUCTOR. ABDOMEN WITH UROPODA AND LAST SEGMENT OF THORAX.

Spence Bate[a] describes a species of *Sphæroma*, *Sphæroma vastator*, which was procured "from a piece of wood which had formed part of a railway bridge over one of the backwaters of the West Coast of the Indian Peninsula." The wood is described as being "honeycombed with cylindrical holes, in many of which the animal was rolled up like a ball." Notwithstanding the close resemblance in habits and appearance of this species, as described and figured, to the present one, there are four points of difference:

I. *The number and arrangement of the tubercles in the two species.*—In *S. vastator* four tubercles are described on each of the last three segments of the thorax, and only two are figured on the anterior portion of the pleon. In the species under discussion, however, there are four tubercles on the seventh segment of the thorax

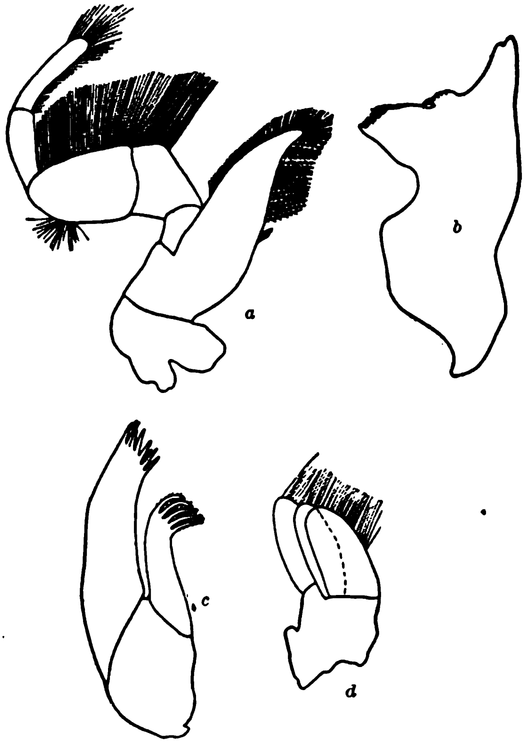

FIG. 298.—SPHÆROMA DESTRUCTOR. *a*, MAXILLIPED. × 27½. *b*, MANDIBLE (PALP OMITTED). × 27½. *c*, FIRST MAXILLA. × 27½. *d*, SECOND MAXILLA. × 27½.

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[a] Ann. of Nat. Hist. (3), XVII, p. 28, pl. II, fig. 4.

only, and six on the abdomen, two on the first abdominal segment, and four on the anterior portion of the terminal segment.

II. *The structure of the feet.*—In *S. vastator* the legs of the first three pairs are not proportionately as long as those of the present species. The merus is differently shaped, not being cylindrical in that species, and is relatively shorter. Although Spence Bate mentions no dissimilarity in structure in the legs of the fourth and fifth pairs, still a difference is shown in the cut in the formation of the merus. With our species the difference in these two pairs of legs is merely in proportion. There is a greater resemblance in the sixth and seventh pairs of legs of the two species.

III. *The upcurved margin of the posterior half of the terminal segment of the abdomen.*

IV. *The presence of numerous tubercles furnished with bristle-like hairs upon the abdomen.*

Neither of these points are mentioned in the description of *Sphæroma vastator*.

In a recent paper, "Gregarious Crustacea from Ceylon," Rev. T. R. R. Stebbing[a] places *Sphæroma destructor* from Florida in the synonymy of *Sphæroma tenebrans* Bate from Brazil, and also refers to that species *Sphæroma vastator* Spence Bate from Madras, and considers specimens sent him from Ceylon as belonging to that species.

In the above description I have pointed out the differences between *Sphæroma destructor* and *Sphæroma vastator*. It remains to point out the differences which exist between *Sphæroma destructor* and the specimens which Dr. Stebbing had from Ceylon.

The specimens from Florida have the abdomen "thickly tuberculate with low but distinct tubercles, each one surmounted with a tuft of small hairs or bristles." Stebbing says, in reference to this character, that this feature is not of the highest importance, and in some of his specimens can not easily be discerned. In the Florida specimens these tufts are most conspicuous and very apparent in all the specimens. Stebbing further states that in a dorsal view of *Sphæroma destructor* they are not even indicated in the figure. The drawing was merely an outline drawing, not a finished one, and the statement of the tuberculate character of the abdomen was made in the text. The above illustration (fig. 295) fully shows this point as well as the difference, in this respect, between the specimens from Florida and those of Stebbing. Neither in the text nor in the figure is there any indication of tubercles on the abdomen of Stebbing's specimens.

The specimens from Florida have the inner plate of the first maxillæ tipped with five strong plumose setæ and occasionally a sixth one that is feeble; on the outer plate are eleven spines. Stebbing's specimens have three strong plumose setæ and one that is feeble on the inner plate, and nine spines on the outer plate of the first maxillæ.

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[a] Spolia Zeylanica, II, Pt. 5, 1904, pp. 16–21.

The terminal abdominal segment in Stebbing's specimens has the sides near the apex incurved. In the Florida specimens the sides are straight.

The outer branch of the uropoda in *S. destructor* has four teeth on the exterior margin, and a slight indication of a fifth in some specimens. There are never six teeth, and the fifth one is never well developed and strong as the four, which are constant in size and number. Stebbing says that this number is also found in the Ceylon specimens, the precise number being immaterial, but later, in pointing out the affinity of *Sphæroma felix* Lanchester, with the species in question, refers to the outer ramus in *Sphæroma felix* as having eight small teeth on the outer margin, this being a character to be considered in separating the species.

The second, third, and fourth segments of *Sphæroma destructor* are each crossed by a transverse ridge. In Stebbing's specimens only the fourth segment has a transverse ridge.

The apical tooth of the mandibles is sub-bifid in the Florida specimens.

SPHÆROMA PENTODON Richardson.

Sphæroma pentodon RICHARDSON, Harriman Alaska Exp. Crust., X, pp. 214–215; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 659–660—HOLMES, Proc. Cal. Acad. Sciences (3), III, 1904, pp. 323–324, pl. XXXVII, fig. 43.

Localities.—Sausalito, San Francisco Bay, California. Found in mud flat.

Body elliptical in outine; color dark brown; surface minutely but densely granular.

Head situated transversely, with a prominent ridge on the anterior margin. Eyes placed postlaterally, and composed of many ocelli. First pair of antennæ extend to the posterior margin of the head; flagellum eight-jointed. Second pair of antennæ reach the middle of the second thoracic segment; flagellum composed of fifteen joints.

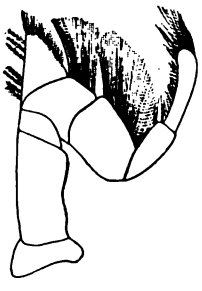

FIG. 299.—SPHÆROMA PENTODON. MAXILLIPED. × 27½.

Segments of the thorax about equal in length, with the exception of the first, which is somewhat longer than any of those following. The lateral parts, which are not distinctly separated from the dorsal portion of the segments, are drawn out in acute processes in the first three segments. Those of the following segments are more nearly regular in outline.

The abdomen is somewhat broader than the thorax, although this expansion of the abdomen does not show in a dorsal view. The first segment is about equal in length to the last thoracic segment, and is marked on either side by two suture lines indicative of coalesced segments. The terminal segment is entire, and not produced, being evenly rounded in outline. The anterior portion of the segment is convex, with a longitudinal series of four small tubercles on either side of the median line, the two series being close together. The posterior extremity of the segment is marked by a prominent transverse elevation.

The inner immovable branch of the uropoda is narrow, elongate, and pointed posteriorly; it extends to the extremity of the abdomen. The outer mobile branch is provided on the lateral margin with five strong teeth. Both branches are of equal length.

The first three pairs of legs are slender, and are furnished with long hairs. The other four pairs are somewhat stouter.

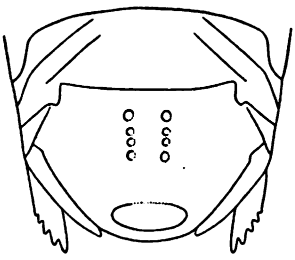

FIG. 300.—SPHÆROMA PENTODON. ABDOMEN. × 8.

Ten specimens were collected at Sausalito, California, by Dr. Ritter and party.

This species is perhaps more closely allied to *Sphæroma sieboldii* Dollfus[a] from Japan than it is to any of the known species of the genus from the Pacific coast of North America. It differs, however, from that species in having a prominent transverse elevation on the posterior portion of the terminal segment, while in *S. sieboldii* the posterior part of the segment is distinctly concave; in having five teeth on the lateral margin of the outer uropod, while in *S. sieboldii* there are seven; in having fifteen joints to the flagellum of the second pair of antennæ, while this organ in *S. sieboldii* has a flagellum composed of only ten joints; in having two longitudinal series of four small tubercles, one on either side of the median line on the terminal abdominal segment, while in *S. sieboldii* the granulations on the caudal segment form, in the middle, two divergent lines; and in having the body covered with minute granulations, while in *S. sieboldii* the granulations are strong and more prominent.

The type is in the Museum of the University of California. The cotype is in the U. S. National Museum, Cat. No. 28768.

49. Genus EXOSPHÆROMA Stebbing.

Second, third, and fourth articles of the palp of the maxillipeds produced into lobes.

The outer branch of the uropoda is not denticulate on the exterior margin.

Characters otherwise as in the genus *Sphæroma* Latreille.

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[a] Notes from the Levden Museum, XI, 1889, pp. 93, 94, pl. v.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS EXOSPHÆROMA.

a. Body widening gradually from the head backward. Thorax transversely ridged and provided with three longitudinal rows of small tubercles. Branches of uropoda very large, expanded............*Exosphæroma amplicauda* (Stimpson)

a'. Body not increasing in width from the head backward. Surface of thorax smooth. Branches of uropoda not expanded.

b. Extremity of terminal abdominal segment produced in a rhomboid process.
Exosphæroma rhomburum (Richardson)

b'. Extremity of terminal abdominal segment not produced in a rhomboid process.

c. Surface of abdomen with tubercles.

d. Abdomen posteriorly ending in a triangular apex, on either side of which is a small tooth.

e. With three tubercles at base of terminal abdominal segment. Outer branch of uropoda not longer than inner branch and both shorter than terminal segment of abdomen. Outer branch not acutely produced.
Exosphæroma yucatanum (Richardson)

e'. With two tubercles at base of terminal abdominal segment. Outer branch of uropoda extending beyond the inner branch, a distance equal to half the length of the inner branch. Outer branch very acute at extremity.........................*Exosphæroma faxoni*, new species

d'. Abdomen posteriorly rounded. With eight tubercles, six on terminal segment and two on preceding segment.
Exosphæroma octoncum (Richardson)

c'. Surface of abdomen without tubercles.

d. Outer branch of uropoda smooth on exterior margin.

e. Outer branch of uropoda half as long as inner branch and half as wide.
Exosphæroma thermophilum (Richardson)

e'. Outer branch of uropoda more than half as long as inner branch.

f. Outer branch four-fifths as long as inner branch and half as wide.
Exosphæroma dugesi (Dollfus)

f'. Outer branch two-thirds as long and as wide as inner branch.
Exosphæroma oregonensis (Dana)

d'. Outer branch of uropoda crenulated on exterior margin.
Exosphæroma crenulatum (Richardson)

EXOSPHÆROMA AMPLICAUDA (Stimpson).

Sphæroma amplicauda Stimpson, Bost. Jour. Nat. Hist., VI, 1857, p. 510.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 835; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 179; Amer. Naturalist, XXXIV, 1900, p. 222.

Localities.—Tomales Bay, California; Kyska Harbor, Alaska; north coast of Amchitka, Alaska; Monterey Bay, California.

Found in low water on beach.

Body narrower anteriorly than posteriorly, gradually increasing in width from the head to the abdomen, a little more than one and a half times longer than broad, 5 mm.: 8 mm.

Head a little more than twice as wide as long, with a frontal border arising between the eyes, which is produced in a small median point. The eyes are small, round, composite, and situated in the post-lateral angles of the head. The first pair of antennæ have the basal article long and equal in length to the third; the second article is half as long as either of the other two. The flagellum is composed of five articles. The first antennæ extend to the posterior margin of the head. The second antennæ have the first two articles very short and equal in length; the third and fourth are about equal in length and each is twice as long as the second; the fifth article is one and a half times longer than the fourth. The flagellum is composed of nine articles. The second antennæ extend almost to the posterior margin of the first thoracic segment. The maxilliped has a palp of five articles. The mandible has a palp of three articles.

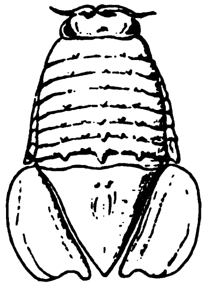

FIG. 301.—EXOSPHÆROMA AMPLICAUDA (AFTER STIMPSON). × 8.

The first segment of the thorax is a little longer than any of the others. The lateral parts of all the segments are bent downward, forming an angle with the dorsal portion. The epimera are not distinct from the segments, but are indicated by a faint line on either side of the segment a little distance within the place where the lateral part of the segment forms the angle with the dorsal part.

The abdomen is composed of two segments. The first segment has three suture lines on either side, indicating three coalesced segments. The terminal segment is triangular in shape with apex rounded. The uropoda are very large, both branches extending to the tip of the abdomen, and being of equal width. The outer movable branch is rounded posteriorly. The inner immovable branch has the outer post-lateral angle rounded, the inner one produced.

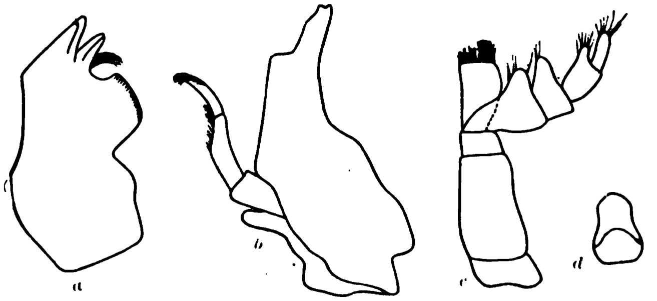

FIG. 302.—EXOSPHÆROMA AMPLICAUDA. *a, b*, MANDIBLES. × 51⅓. *c*, MAXILLIPED. × 51⅓. *d*, FRONTAL LAMINA AND CLYPEUS. 51⅓.

The last three segments of the thorax and the first segment of the abdomen have rudiments of tubercles on their posterior margins. In the specimens examined there are no tubercles on the anterior segments, which may be due to size, all the specimens being very small. There are also four tiny tubercles arranged in two longitudinal series of two, one on each side of the median line at the base of the terminal segment. The legs are all ambulatory.

EXOSPHÆROMA RHOMBURUM (Richardson).

Sphæroma rhomburum RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 835–836; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 179; American Naturalist, XXXIV, 1900, p. 222.

Locality.—Monterey Bay, California.

Surface of body punctate; color, whitish yellow.

Head small. First pair of antennæ reach almost to the posterior margin of the first thoracic segment. Second pair of antennæ extend quite to the posterior margin of the first thoracic segment. Eyes situated post-laterally.

Thoracic segments equal in length. Epimera broad and short, extending downward, forming an angle with the segments.

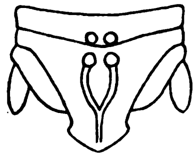

FIG. 303.—EXOSPHÆROMA RHOMBURUM. ABDOMEN. × 13⅓.

First abdominal segment as long as any of the thoracic segments, crossed by suture lines and surmounted by two tubercles, close together, one on either side of the median line. Terminal segment with its extremity produced in a process rhomboid in shape, and with sides infolded, forming a kind of funnel-like opening when seen from beneath. At the base of this segment are two tubercles, which are continuous with two longitudinal ridges in the center of the segment. These ridges unite near the extremity, and continue as one median ridge. The uropoda are shorter than the terminal segment; the outer branch is more lanceolate in shape; both are of equal length.

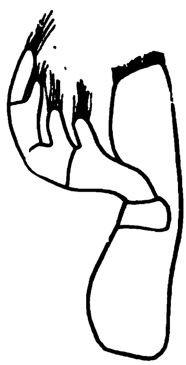

FIG. 304.—EXOSPHÆROMA RHOMBURUM. MAXILLIPED. × 51⅓.

Two specimens were taken at Monterey Bay, California, by Mr. Heath.

Type.—Cat. No. 22573, U.S.N.M.

This species is similar to *S.* (?) *egregium* Chilton, from Akaroa, but differs in the presence of two tubercles on the first abdominal segment, in the presence of two tubercles and two longitudinal ridges uniting in a single ridge on the terminal segment, and in the equality in length of the two branches of the uropoda.

EXOSPHÆROMA YUCATANUM (Richardson).

Sphæroma yucatanum RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 534.

Locality.—Cape Catoche, Yucatan.

Depth.—24 fathoms.

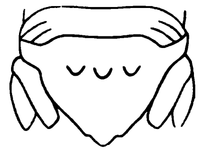

FIG. 305.—EXOSPHÆROMA YUCATANUM. ABDOMEN.

Head transverse; eyes situated at the extreme post-lateral angles. First pair of antennæ short, reaching the posterior margin of the head; flagellum six-jointed. Second pair of antennæ, with a flagellum composed of ten joints, extend to the posterior margin of the second thoracic segment.

First thoracic segment longer than any of the following segments, its post-lateral angles produced. The remaining segments of equal length; epimera produced laterally into acute processes.

First abdominal segment with suture lines. Last segment terminating posteriorly in an obtuse point, on either side of which is a small tooth. The base of the segment bears three low tubercles, one in the median line and one on either side. The uropoda are short, not reaching the post-lateral teeth. Both branches are equal in length and width, the outer branch pointed, the inner branch truncate.

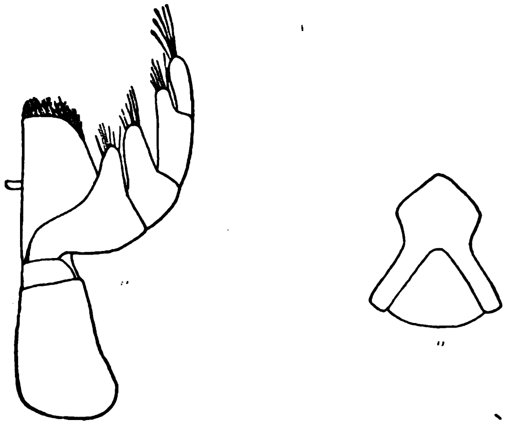

FIG. 306.—EXOSPHÆROMA YUCATANUM. *a*, MAXILLIPED. × 77½. *b*, FRONTAL LAMINA AND CLYPEUS. (DIAGRAMMATIC.)

Surface of body smooth; color bluish.

One specimen was taken at Cape Catoche, Yucatan.

Type.—Cat. No. 23905, U.S.N.M.

EXOSPHÆROMA FAXONI, new species.

Body ovate, nearly twice as long as wide, 2½ mm. : 5½ mm.

Head twice as wide as long, 1 mm. : 2 mm., with the anterior margin rounded and produced in a small median point. There is a marginal border extending across the anterior portion of the head as far as the second article of the first antenna on either side. Eyes small, round, composite and situated in the post-lateral angles of the head. The first pair of antennæ have the first article long and stout; the second article is half as long as the first; the third is one and a half times as long as the second. The flagellum is composed of twelve articles and extends to the post-lateral angle of the first thoracic segment. The second pair of antennæ have the first article short and almost inconspicuous; the second article is about twice as long as the first; the third is about one and a half times as long as the second; the fourth is one and a half times as long as the third; the fifth is one and a half times as long as the fourth. The flagellum is composed of twelve articles and extends a little beyond the flagellum of the first pair of antennæ.

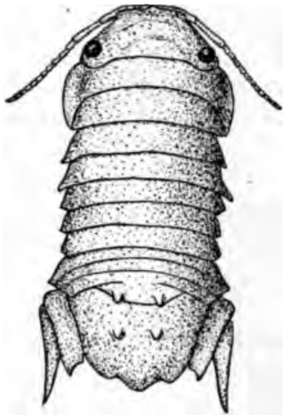
FIG. 307.—EXOSPHÆROMA FAXONI. × 10.

The first segment of the thorax is a little longer than any of the others, which are subequal. The post-lateral angles of the first segment are produced backward in a long process on either side, extending to the posterior margin of the second thoracic segment and having the extremities truncate. These processes extend laterally some distance beyond the lateral margins of the second segment. The following six segments have the epimera separated by faint lines from the segments and produced in acute points directed laterally. Those of the fifth segment extend laterally some distance beyond those of the other segments.

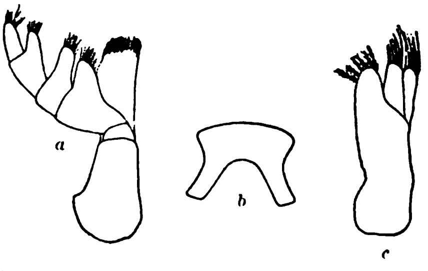

FIG. 308.—EXOSPHÆROMA FAXONI. *a*, MAXILLIPED. × 51⅓. *b*, FRONTAL LAMINA. × 27½. *c*, SECOND MAXILLA. × 51⅓.

The abdomen is composed of two segments. The first segment is twice as long as the last thoracic segment and has two small tubercles on the posterior margin, one on either side of the median line. Lateral to these the posterior margin is produced backward in a small point on either side. There are three suture lines on either side of this segment, indicating partly coalesced segments. The terminal segment has two tubercles situated on the convex dorsal surface, one on either side of the median line, about the middle of the segment. This segment terminates posteriorly in three small teeth, one median and one lateral to this on either side. The inner fixed branch of the uropoda does not extend beyond the tip of the terminal abdominal segment. The outer post-lateral angle is very acute. The outer branch of the uropoda is very long and extends beyond the inner branch a distance equal to half the length of the inner branch. It terminates in a long acute extremity.

Only one specimen of this species was taken in Florida by Prof. A. S. Packard.

The type is in the Museum of Comparative Zoology at Harvard College. Cat. No. 6732, M. C. Z.

This species is named for Prof. W. S. Faxon, who very kindly assisted me by letting me have for examination the collection in the Museum of Comparative Zoology at Harvard University.

EXOSPHÆROMA OCTONCUM (Richardson).

Sphæroma octoncum RICHARDSON, Proc. U. S. Nat. Mus.,XXI, 1897, p. 836; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 180; American Naturalist, XXXIV, 1900, p. 223.

Locality.—Monterey Bay, California.

Body with all the thoracic segments, except the first, marked with four conspicuous brown spots, two on either side of the median line, and with two spots on the first abdominal segment, one on either side of the median line.

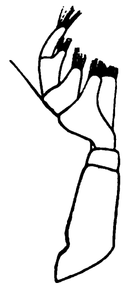

FIG. 309.—EXOSPHÆROMA OCTONCUM. MAXILLIPED. × 51⅓.

Head small. First pair of antennæ reach almost to the posterior margin of the first thoracic segment. Second pair extend fully to the posterior margin of the first segment.

Thoracic segments subequal. Epimera broad and extending downward, forming an angle with the segments.

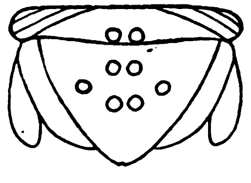

FIG. 310.—EXOSPHÆROMA OCTONCUM. ABDOMEN. × 13⅓.

First abdominal segment with two low tubercles close together, situated one on either side of the median line; terminal segment triangular, with apex narrowly rounded and sides slightly infolded, forming a small opening when seen from below. Six low tubercles are situated on this segment, two in longitudinal series on either side of the median line—the lower ones being a little farther apart than the upper ones—and one on either side of the series. The uropoda do not reach the extremity of the abdomen by some little distance. The outer branch is the shorter and is broadly rounded posteriorly. The inner branch is more pointed at the extremity.

Five individuals of this species were sent by Mr. Heath from Monterey Bay, California.

Type.—Cat. No. 22574, U.S.N.M.

EXOSPHÆROMA THERMOPHILUM (Richardson).

Sphæroma thermophilum RICHARDSON, Proc. U. S. Nat. Mus., XX, 1897, pp. 465–466; Amer. Naturalist, XXXIV, 1900, p. 223.

Locality.—New Mexico, near Socorro, in a warm spring.

Head nearly three times as broad as long, with its anterior margin widely rounded. Eyes round and post-laterally situated. The first pair of antennæ, with a flagellum of eight articles, extend to the middle of the first thoracic segment. The second pair of antennæ reach the posterior margin of the first thoracic segment; the flagellum consists of eleven articles.

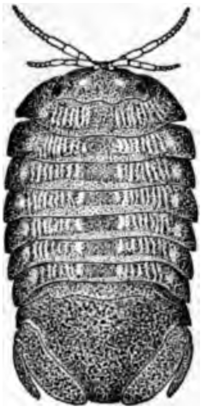

FIG. 311.—EXOSPHÆROMA THERMOPHILUM. × 4⅔.

The thoracic segments are all similar with the exception of the first, which extends laterally around the head, almost touching the peduncle of the first pair of antennæ with its anterior angle. The epimeral parts are continuous with the segments, with no indication of a separation from them. The abdomen is formed of two distinct segments, the first of which is partly covered by the last thoracic segment, the second is subtriangular, rounded posteriorly. The internal lamella of the uropods is moderately broad, well rounded, and extends to the posterior edge of the last abdominal segment. The external lamella is half as long and half as broad as the internal one, and is more pointed at its extremity.

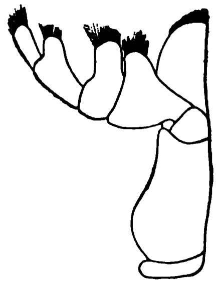

FIG. 312.—EXOSPHÆROMA THERMOPHILUM. MAXILLIPED. × 38⅔.

The body is oblong-ovate with almost parallel sides. Its surface is entirely smooth.

The grayish-brown color of the body is everywhere marked with small black spots and lines, which run together, forming a broad, black band in the center of each one of the thoracic segments. All the exposed edges of the body are tinged with a bright orange.

This species can readily be distinguished from *Exosphæroma dugesi*, to which it is closely related, by the absence of hairs on the body, by the relative length of the uropods, the outer branch being only half as long as the inner one, while in *Exosphæroma dugesi* both branches are of nearly equal length, and by the difference in color.

Type.—Cat. No. 19609, U.S.N.M.

EXOSPHÆROMA DUGESI (Dollfus).

Sphæroma dugesi DOLLFUS, Bull. Soc. Zool. France, XVIII, 1893, p. 115, figs. 1-2.

Locality.—Mexico (fresh water); Eaux thermales d'Aguas-Calientes, état d'Aguas Calientes; Mexico.

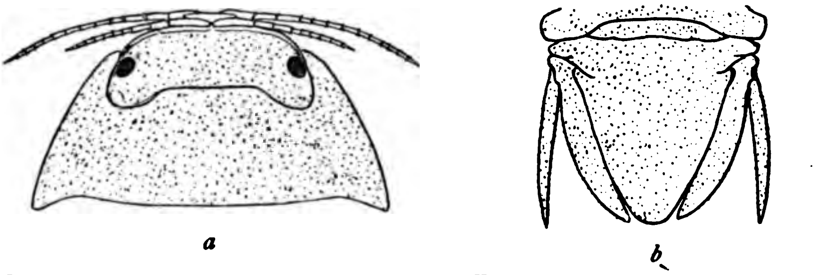

FIG. 313.—EXOSPHÆROMA DUGESI (AFTER DOLLFUS). *a*, HEAD AND FIRST THORACIC SEGMENT. *b*, ABDOMEN AND UROPODA.

Body ovate, twice as long as wide, 6 mm.: 12 mm.

Head twice as wide as long, 2 mm.: 4 mm., with a frontal border arising between the eyes and produced in a small median point.

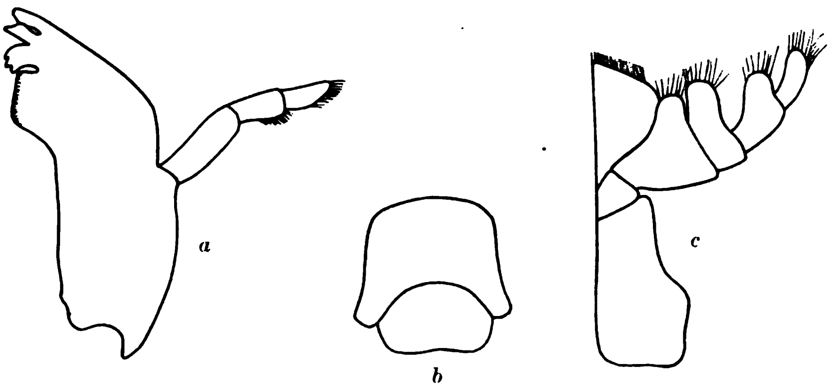

FIG. 314.—EXOSPHÆROMA DUGESI. *a*, MANDIBLE. × 41. *b*, FRONTAL LAMINA AND CLYPEUS. × 23. *c*, MAXILLIPED. × 41.

Eyes small, round, composite, and situated in the post-lateral angles of the head. The basal article of the first pair of antennæ is long; the second is half as long as the first; the third is one and a half times longer than the second. The flagellum is composed of eight articles. The first antennæ extend to the middle of the first thoracic segment

The basal article of the second antennæ is very short; the second and third are longer than the first and subequal; the fourth and fifth are about equal and each is one and a half times longer than the third. The flagellum is composed of twelve articles. The second antennæ extend a little beyond the posterior margin of the first thoracic segment. The maxilliped has a palp of five articles. The palp of the mandibles is composed of three articles. The frontal lamina is large and conspicuous, and has the anterior division wide and long, with the post-lateral or ventral angles drawn out, giving it somewhat of a horse-shoe shape. The clypeus is transversely oblong, and fits into the concavity of the posterior part of the frontal lamina; its posterior margin is fringed with cilia.

The segments of the thorax are equal in length. The epimera are not distinct from the segments. The lateral margins are nearly straight.

The abdomen is composed of two segments. The first segment is about as long as the last thoracic segment and has one suture line on either side. The terminal segment is triangular, with the apex bluntly rounded. The inner fixed branch of the uropoda is as long as the terminal segment. The outer moveable branch is about half as wide as the inner branch, is very pointed at its extremity, and when folded is not quite as long as the inner branch, being 1 mm. shorter. The length of the inner branch is 5 mm.; that of the outer branch is 4 mm.

The legs are all ambulatory.

EXOSPHÆROMA OREGONENSIS (Dana).[a]

Sphæroma oregonensis DANA, Proc. Acad. Nat. Sci. Phila., VII, 1854–55, p. 177; U. S. Expl. Exp. Crust., XIV, 1853, p. 778, pl. LII, fig. 4.—STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 509.

Sphæroma olivacea LOCKINGTON, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 45.

Sphæroma oregonensis RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 836; Ann. Mag. Nat. Hist., (7), IV, 1899, p. 180; American Naturalist, XXXIV, 1900, p. 223; Harriman Alaska Exp. Crust., X, 1904, p. 214; Proc. U. S. Nat. Mus., XXVII, 1904, p. 659.

Localities.—Pacific Grove to Alaska; Popof Island (from fresh water), Yakutat, and Glacier Bay, Alaska; Grenville Channel and Lowe Inlet, British Columbia; Angel Island, San Francisco Bay, California (Lockington Coll.); Gulf of Georgia; Alert Bay and Kadiak, Alaska;

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[a] The following description of Dana's, although concise, gives most of the essential characters of the species: Corpus læve. Segmentum caudale breve, posticè latissimè rotunatum, supra læve. Styli caudales abdomen non superantes, lamellâ internâ multo longiore quam externa, fere obtusâ, externa obtusâ. Flagella antennarum 1marum 2darumque 12–14 articulata.

Body smooth. Caudal segment short, very broadly rounded behind, smooth above. Caudal stylets not reaching beyond line of extremity of abdomen; inner lamella much the longer, nearly obtuse; outer obtuse. Flagella of antenna of both pairs twelve to fourteen jointed. Length of body four and a half lines.

near Wrangell, Alaska; Puget Sound; Kyska Harbor, Alaska; Monterey Bay, California; Middleton Island; Unalaska; Sitka, Alaska; Bering Island; Sanborn Harbor, Nagai Island; Saginaw Bay, Alaska; North Grebnitzky.

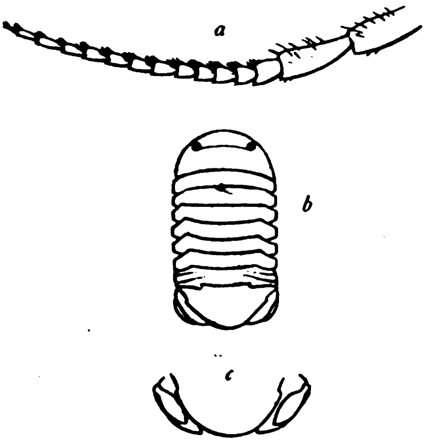

FIG. 315.—EXOSPHÆROMA OREGONENSIS (AFTER DANA). *a*, SECOND ANTENNA. *b*, GENERAL FIGURE. *c*, ABDOMEN (UNDERSIDE). (ALL ENLARGED.)

Found on beach at low tide; 10–12 fathoms, in gravel, sand, and stones; rocky beach under stones; in mud.

Body ovate, twice as long as wide, 4 mm.: 8 mm.

Head three times as wide as long, 1 mm.: 3 mm., with the frontal margin bi-sinuate, or excavate on either side of a small median point. Eyes small, round, composite, and placed in the post-lateral angles of the head. The first antennæ have the basal article large; the second article is half as long as the first; the third is one and a half times [illegible]ger than the second. The flagellum is composed of thirteen [illegible]es. The first antennæ extend to the posterior margin of the head. The second antennæ have the basal article very short and almost inconspicuous; the second article is about three times as long as the first; the third is about as long as the second; the fourth is nearly twice as long as the third; the fifth is as long as the fourth. The flagellum is composed of thirteen articles. The second antennæ extend to the posterior margin of the second thoracic segment. The maxilliped has a palp of five articles. Mandibles with a three-jointed palp.

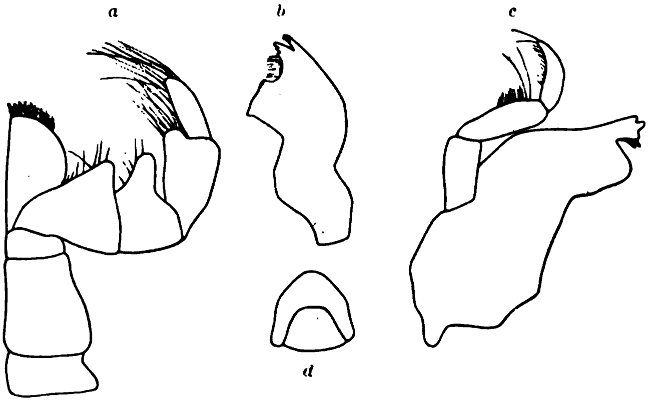

FIG. 316.—EXOSPHÆROMA OREGONENSIS. *a*, MAXILLIPED. × 51⅓. *b*, MANDIBLE, PALP REMOVED. × 51⅓. *c*, MANDIBLE WITH PALP. × 51⅓. *d*, FRONTAL LAMINA AND CLYPEUS. × 51⅓.

The first segment of the thorax is a little longer than any of those following. The epimera are not distinct from the segments, but can be distinguished from the segment by a faint line on either side. They are laterally produced into a rather acute process on either side.

The abdomen is composed of two segments. The first segment has three suture lines on either side indicating three partly coalesced segments. The terminal segment is round posteriorly. The inner immovable branch of the uropoda is as long as the terminal segment, and is narrowly rounded at the extremity. The outer branch is two-thirds the length of the inner branch and is rounded posteriorly.

The legs are all ambulatory.

EXOSPHÆROMA CRENULATUM Richardson.[a]

Sphæroma crenulatum RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 292–293, pl. XXXIX, fig. 40.

Locality.—Bermudas.

Surface of body smooth. Color, light brown, with markings of black.

Head rounded in front with small median point, on either side of which is a small excavation. Eyes situated post-laterally.

First pair of antennæ with the first joint of the peduncle long; second joint half as long as first; third joint equal in length to first; flagellum of five joints reaches the post-lateral margin of the head.

Second pair of antennæ extend to the middle of the first thoracic segment.

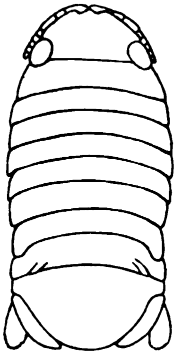

FIG. 317.—EXOSPHÆROMA CRENULATUM.

Thoracic segments subequal. Lateral margins straight. Epimera not distinctly separated from segments.

First abdominal segment long, a little longer than any of the thoracic segments, with two suture lines. Terminal segment very convex, surface smooth, posterior margin widely rounded. Uropoda not extending beyond tip of terminal segment. Inner branch somewhat pointed at its extremity, margin smooth. Outer branch widely rounded and crenulate on the posterior edge.

Legs similar, all ambulatory, with small curved dactyli.

A number of specimens were collected at the Bermudas in 1876–77, by Dr. George Brown Goode.

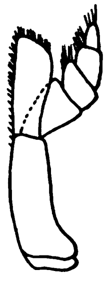

FIG. 318.—EXOSPHÆROMA CRENULATUM. MAXILLIPED. × 77½.

Type in Peabody Museum, Yale University. Cat. No. 3250.

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[a] This species is intermediate between *Sphæroma* and *Exosphæroma*. The second, third, and fourth articles of the palp of the maxillipeds are but little produced. Stebbing mentions another species, *Sphæroma globicauda* Dana, which is also intermediate between *Sphæroma* and *Exosphæroma*, The Fauna and Geography of the Maldive and Laccadive Archipelagoes, II, Pt. 3, 1905, p. 710.

50. Genus DYNAMENE Leach.

Abdomen composed of two segments, the first of which is formed by the fusion of several coalesced segments. The terminal segment is emarginate posteriorly, without a lobe within the emargination.

The branches of the uropoda are similar, both being salient; they are alike in the two sexes. The inner immovable branch is fixed to the side of the abdomen. The outer branch is movable and capable of folding under the inner branch.

The second, third, and fourth articles of the palp of the maxillipeds are produced into lobes.

Legs all ambulatory.

Sexes alike.

Inasmuch as the male is known in four of the species of this genus and as the male and female are alike, I am not willing to unite *Cilicæa* and *Dynamene* in a single genus *Dynamene*, the males of *Cilicæa* being unlike the females as is the opinion of Prof. S. J. Holmes and Dr. H. F. Moore, the former considering *Dynamene tuberculosa* the female of *Cilicæa cordata* and the latter supposing *Dynamene bermudensis* to be the female of *Cilicæa caudata.*

ANALYTICAL KEY TO THE SPECIES OF THE GENUS DYNAMENE.

a. Posterior extremity of terminal segment of abdomen with a heart-shaped opening immediately above the terminal excavation........ *Dynamene perforata* Moore

a'. Posterior extremity of terminal segment of abdomen without heart-shaped opening above the terminal excavation.

  b. Surface of abdomen smooth .... *Dynamene glabra* Richardson

  b'. Surface of abdomen with tubercles or longitudinal ridges.

    c. Surface of abdomen with tubercles.

      d. Basal part of terminal segment of abdomen with three tubercles. *Dynamene angulata* Richardson

      d'. Basal part of terminal segment of abdomen with four small tubercles. *Dynamene moorei*, new species

    c'. Surface of abdomen with longitudinal ridges.

      d. Surface of terminal segment of abdomen with three longitudinal ridges. Front of head produced in a quadrangular process. First two articles of peduncle of the first antennæ flattened and dilated. *Dynamene dilatata* Richardson

      d'. Surface of terminal segment of abdomen with four longitudinal ridges. Front of head not produced. First two articles of peduncle of second antennæ not flattened and not greatly dilated. *Dynamene benedicti* Richardson

DYNAMENE PERFORATA Moore.

Dynamene perforata Moore (male), Bull. U. S. Fish Commission, XX, Pt. 2, 1902, pp. 173-174, pl. x, figs. 9, 11-19.—Richardson (male), Trans. Conn. Acad. Sci., XI, 1902, pp. 291-292, pl. xxxix, fig. 39.

Localities.—Culebra, Porto Rico; Bermudas. Found on mangrov roots.

Head broader than long; eyes situated post-laterally. First pair of antennæ with the first two peduncular joints large, the second half as long as the first; the third joint long and slender, twice as long as second joint; flagellum consists of seven joints. The first two peduncular joints of the second pair of antennæ are of equal length; the following three are of equal length and longer than the first two; the flagellum consists of about seven joints, and extends to the posterior margin of the third thoracic segment.

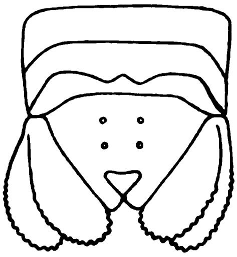

FIG. 319.—DYNAMENE PERFORATA. LAST TWO THORACIC SEGMENTS AND ABDOMEN.

The thoracic segments are of equal length, with the exception of the first, which is slightly longer. The seventh segment is produced backward in two rounded lobes, one on either side of the median line, and close together.

The first abdominal segment has two suture lines at either side, indicative of coalesced segments. The terminal segment is very convex at the base, and has four small tubercles, forming a square on the convexity. Its apex has a heart-shaped opening, formed by the pro-

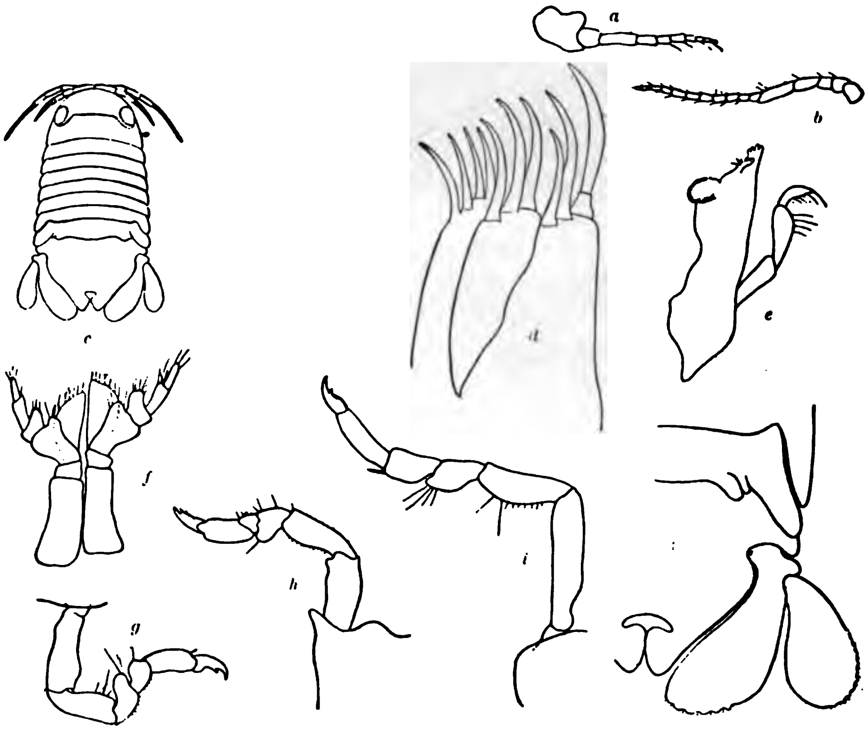

FIG. 320.—DYNAMENE PERFORATA (AFTER MOORE). *a*, FIRST ANTENNA. *b*, SECOND ANTENNA. *c*, MALE. *d*, TIP OF MAXILLA. *e*, MANDIBLE. *f*, MAXILLIPEDS. *g*, FOURTH LEG. *h*, FIRST LEG. *i*, SEVENTH LEG. *j*, PART OF TERMINAL SEGMENT OF ABDOMEN WITH UROPOD.

longation of the lateral margins, which prolongations meet anteriorly and are divergent posteriorly, so that a triangular excavation is formed on the posterior end of the segment immediately below the heart-shaped opening.

The two branches of the uropoda are similar in shape and size. They are large, very much expanded, rounded posteriorly, with margins distinctly crenulate or denticulate, and extend some distance beyond the tip of the terminal abdominal segment.

The color is brown, with markings of black. Surface smooth, with the exception of the abdomen, which is very granular.

Several specimens differ from the specimen described in not having the seventh thoracic segment produced in lobes, and are without the four small tubercles at the base of the terminal segment. Several differ in having the uropoda not longer than the terminal segment.

Both sexes are known, the male and female being alike in every respect; in the male the inner branch of the second pleopods carries a stylet.

Cotypes are in the Peabody Museum, Yale University. Cat. No. 3204.

DYNAMENE GLABRA Richardson.

Dynamene glabra RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 834; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 178; American Naturalist, XXXIV, 1900, p. 224.—HOLMES, Proc. Cal. Acad. Sci. (3), III, 1904, No. 11, p. 304.

Localities.—Monterey Bay, California; Mendocino County, California; San Diego, California.

Body oval; surface smooth.

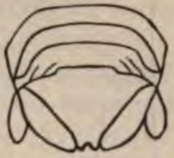

FIG. 321.—DYNAMENE GLABRA. ABDOMEN AND LAST TWO THORACIC SEGMENTS. ×13⅓.

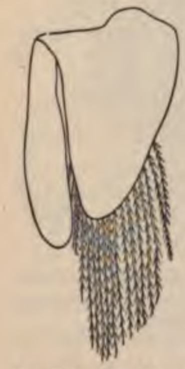

FIG. 322.—DYNAMENE GLABRA. SECOND PLEOPOD OF MALE. × 51⅓.

Head small; eyes situated post-laterally. First pair of antennæ extend to the eye; first joint oblong; second joint short, half as long as first; flagellum consists of six articles. Second pair of antennæ extend to the posterior margin of the first thoracic segment; flagellum consists of about ten articles.

The thoracic segments are subequal; the first is a little longer than any of the others.

The penultimate abdominal segment consists of several coalesced segments, as indicated by the suture lines. The terminal segment is triangular, with a small median excavation at its extremity. The lower part of this segment is quite flat, the slope being gradual from the convex upper part or base of the segment to the extremity. The surface is perfectly smooth. The inner branch of the uropoda is large and rounded posteriorly; the outer branch is small, though similar in shape, and is much shorter than the inner branch.

A number of specimens were collected by Mr. Heath at Monterey Bay, California, at the surface.

Type.—Cat. No. 22571, U.S.N.M.

Both sexes of this species are known, the two forms resembling each other in every respect, with the exception that in the male there is a stylet on the inner branch of the second pair of pleopods.

Prof. S. J. Holmes writes that the sexes do not show any marked dimorphism. He also admits the following:[a] "An examination of several specimens of the species showed that the males present no appreciable external differences from the females except that, as a rule, they are of somewhat larger size."

Specimens of both sexes are in the collection of the U. S. National Museum. The inner branch of the second pleopod of the male is figured.

DYNAMENE ANGULATA Richardson.

Dynamene angulata Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 534–535.

Locality.—No Name Key, Florida.

Found among algæ at low tide.

Surface of body smooth; color yellow.

Head large, with small median point on its anterior margin. First pair of antennæ reach the posterior margin of the second thoracic segment; flagellum composed of nine joints. Second pair of antennæ reach the posterior margin of the fourth thoracic segment; flagellum composed of thirteen joints.

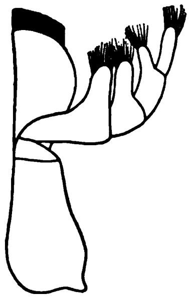

FIG. 323.—DYNAMENE ANGULATA. MAXILLIPED. × 51⅓.

The thoracic segments are subequal in length, the first being a little longer than any of the others. The epimera are broad and short, with acute lateral angulations.

The first abdominal segment bears suture lines indicative of coalesced segments. There are three small tubercles in a transverse row, one median and one on either side. The terminal segment is subtriangular, with the extremity produced and deeply excavate, the excavation being like an inverted V. At the base of this segment are three large tubercles in a transverse row, the median one being long and very acute, the lateral ones rounded. The branches of the uropoda are similar in shape, the outer one being somewhat longer; they are obliquely truncated with the outer posterior angles acutely produced and do not quite reach the tip of the abdomen.

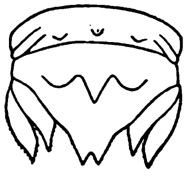

FIG. 324.—DYNAMENE ANGULATA. ABDOMEN.

Specimens were found by Mr. Henry Hemphill at No Name Key, Florida.

Type.—Cat. No. 23906, U.S.N.M.

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[a] Proc. Cal. Acad. Nat. Sci. (3), III, No. 11, 1904, p. 304.

DYNAMENE MOOREI, new species.

Dynamene perforata Moore (female), Bull. U. S. Fish Commission, XX, Pt. 2, 1902, pp. 173–174, pl. x, fig. 10.—Richardson (female), Trans. Conn. Acad. Sci., XI, 1902, pp. 291–292.

Localities.—Culebra, Porto Rico; Bermudas.

Found on mangrove roots.

This species is what Dr. Moore considered to be the female of *Dynamene perforata*. Upon examining the specimens of *Dynamene perforata* (females) I found one to be a male.[a]

Body oblong-ovate, about twice as long as wide, 2 mm.: 4 mm.

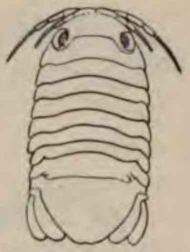

Fig. 325.—Dynamene moorei (after Moore).

Head about twice as wide as long, with the frontal margin rounded and produced in a small median point. Eyes large, composite, and situated in the post-lateral angles of the head. First pair of antennæ have the first and third articles of the peduncle about equal in length; the second shorter than either. The flagellum of eight articles extends to the posterior margin of the first thoracic segment. The second pair of antennæ, with a flagellum of twelve articles, extends to the posterior margin of the second thoracic segment.

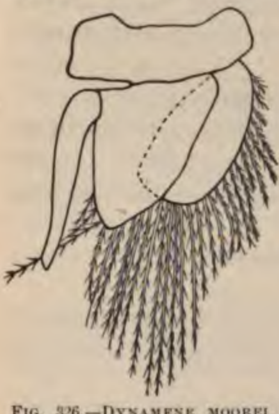

Fig. 326.—Dynamene moorei. Second pleopod of male. × 77½.

The first segment of the thorax is about one and a half times longer than any of the following segments, which are subequal. The seventh segment is produced backward in two small, rather obscure points, close together, one on either side of the median line.

The abdomen is composed of two segments. The second or terminal segment bears four small, rather obscure tubercles on the anterior convex portion. This segment is somewhat triangular in shape, with the apex notched and the sides folded under, forming a kind of funnel-shaped extremity.

The uropoda are large and broad, similar in shape and size, with the extremities rounded and the exterior margins crenulate. They extend but little beyond the extremity of the abdomen.

Both sexes of this species are known, the males and females being similar.

This species is named for Dr. H. F. Moore.

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[a] Since my manuscript was sent to press, Doctor Hansen has returned specimens of *Dynamene perforata* Moore, which he borrowed from the U. S. National Museum. Two specimens, considered by Dr. H. F. Moore to be the females of that species, were sent him. I am gratified to find that he has labeled one "immature male," and the other "adult male."

DYNAMENE DILATATA Richardson.

Dynamene dilatata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 832–833; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 175–176; American Naturalist, XXXIV, 1900, p. 223.

Locality.—Monterey Bay, California.

Body oval; surface very granular; color yellow.

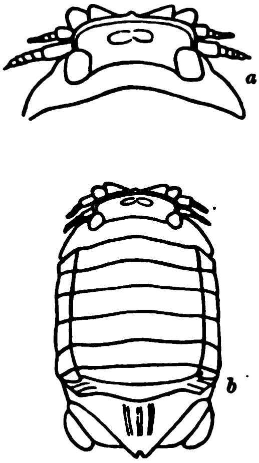

FIG. 327.—DYNAMENE DILATATA. *a*, HEAD AND FIRST THORACIC SEGMENT. × 13½. *b*, DORSAL VIEW. × 10½.

Head rugose, with its anterior margin produced in a quadrangular process, having a small median projection, rounded antero-lateral angles and a thickened edge. First pair of antennæ extend to the posterior margin of the head, first two joints flattened and enlarged; first joint oblong, second joint triangular, and half as long as preceding joint; third joint small, as long as second, but half as wide; flagellum six-jointed. Second pair of antennæ are but little longer than first pair and do not reach the posterior margin of the first thoracic segment.

The thoracic segments are of equal length. The epimera are square or oblong, with straight lateral margins.

The penultimate abdominal segment is short, and crossed with suture lines. The terminal segment is triangular with a small rounded notch at the apex. There are three longitudinal ridges on the segment, one in the median line, and one on either side of it. The uropoda are short, not reaching the extremity of the abdomen, and regularly rounded.

The legs are slender; the first two pairs are covered with long hairs and extend in an anterior direction, the other five pairs extend in a posterior direction.

The type and only specimen was collected by Mr. Heath at Monterey Bay, California, at the surface. Cat. No. 22568, U.S.N.M.

DYNAMENE BENEDICTI Richardson.

Dynamene benedicti RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 834; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 177; American Naturalist, XXXIV, 1900, p. 224.

Locality.—Monterey Bay, California.

Body oblong, oval; surface minutely granular; color dark gray.

Head with small median point. Eyes situated post-laterally. First pair of antennæ extend to the middle of the first thoracic segment;

first joint of peduncle longest; second and third joints about equal in length; flagellum consists of six joints. Second pair of antennæ extend to the posterior margin of the second thoracic segment; flagellum consists of about eleven joints.

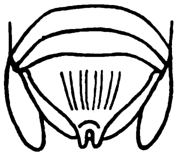

FIG. 329.—DYNAMENE BENEDICTI. LAST THORACIC SEGMENT AND ABDOMEN. × 13½.

The thoracic segments are of equal length. The epimera are square with rounded posterior angles.

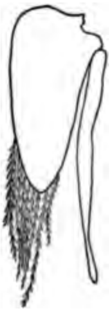

FIG. 328.—DYNAMENE BENEDICTI. SECOND PLEOPOD OF MALE (INNER BRANCH). × 51½.

The penultimate abdominal segment is crossed by suture lines, indicative of coalesced segments. The terminal segment is triangular, terminating posteriorly in two teeth separated by a narrow, rounded, funnel-shaped sinus. This segment is very convex, and bears two longitudinal ridges on either side of the median line. The uropoda do not exceed in length the extremity of the terminal segment. Both branches are rounded posteriorly and are similar in shape and size.

The type was collected by Mr. Heath at Monterey Bay, California, at the surface. Cat. No. 22570, U.S.N.M.

This species is named for Dr. James E. Benedict, assistant curator in the Division of Marine Invertebrates. U. S. National Museum.

Both sexes of this species are known, and are in the collection of the U. S. National Museum. The male and female are alike in every respect, with the exception that the inner branch of the pleopoda in the male is provided with a stylet.

51. Genus PARADYNAMENE, new genus.

Second, third, and fourth articles of the palp of the maxillipeds not produced into lobes. First article of the peduncle of the first antennæ with a long process at the upper end, which is acutely produced, and extends to the extremity of the second article.

Characters otherwise as in the genus *Dynamene*.

Both sexes are known, the male and female being similar, but the male is larger.

PARADYNAMENE BENJAMENSIS, new species.

Body oblong-ovate, twice as long as wide, 5 mm.: 10 mm.

Head wider than long, 2 mm.: 3 mm., with the anterior margin widely rounded and produced over the basal articles of the antennæ, so as to entirely conceal them. The eyes are small, round, composite, and situated in the post-lateral angles. The first pair of antennæ have the first or basal article large and elongated, with a long acutely terminating process at the upper end, half the width of the article and extending to the extremity of the second article; the second article is half as long as the first article (not including this process); the third article is half as wide as the second, which is equal in width to the first, and is about one-half as long as the second, and hardly to be distinguished from the articles of the flagellum. The flagellum is composed of about ten articles, and extends to the posterior margin of the first thoracic segment. The second pair of antennæ have the first article very short; the second and third are subequal and each is about twice as long as the first; the fourth and fifth are subequal and each is a little longer than the third. The flagellum is composed of fourteen articles and extends to the posterior margin of the second thoracic segment.

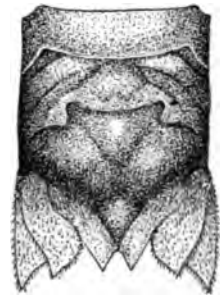

FIG. 330.—PARADYNAMENE BENJAMENSIS. ABDOMEN AND LAST THORACIC SEGMENT OF MALE. × 4.

The first segment of the thorax is about twice as long as any of the following segments, which are subequal. The lateral margins of the body are straight. The epimera are separated on all but the first segment by faint lines.

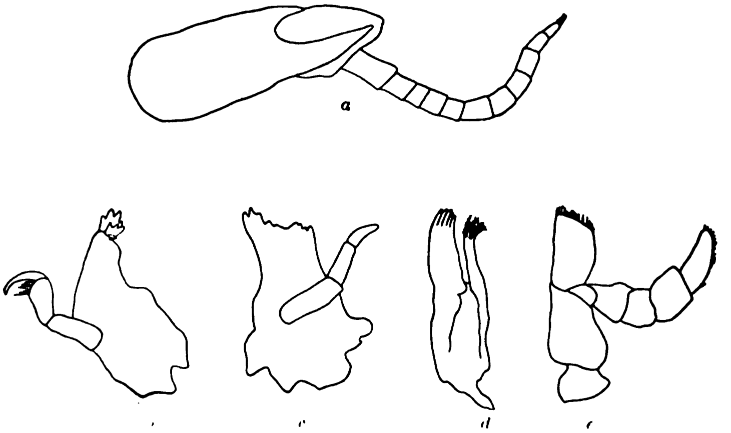

FIG. 331.—PARADYNAMENE BENJAMENSIS. a, FIRST ANTENNA. × 27½. b, c, MANDIBLES. × 27½. d, FIRST MAXILLA. × 27½. e, MAXILLIPED. × 27½.

The abdomen is composed of two segments. The first segment is two and a half times longer than the last thoracic segment, and has three suture lines on either side indicating partly coalesced segments. It is produced backward in a small point on either side. The second or terminal segment has the convex anterior portion surmounted with two very inconspicuously small tubercles, one on either side of the median line. Its posterior extremity has a deep rounded excavation, almost quadrangular in shape. The uropoda are longer than the terminal abdominal segment. The inner branch has the outer post-lateral angle produced in an acute point, the inner angle being rounded. The outer branch is longer than the inner branch, and terminates in an acutely pointed extremity.

The male differs from the female in its much larger size, being 18 mm. long and 7 mm. wide; in the more granular surface of the abdomen and its V-shaped rather than rounded excavation, and in having two depressed lines converging to a point just anterior to the V-shaped excavation, the apex of the point meeting the apex of the V-shaped excavation.

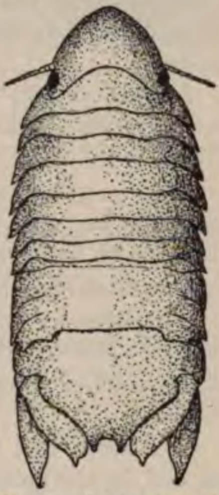

FIG. 332.—PARADYNAMENE BENJAMENSIS. FEMALE (DORSAL VIEW). × 5½.

Four females and one male come from the gulf weed. Collector unknown.

Types in the Museum of Comparative Zoology at Harvard University. Cat. No. 6733, M.C.Z.

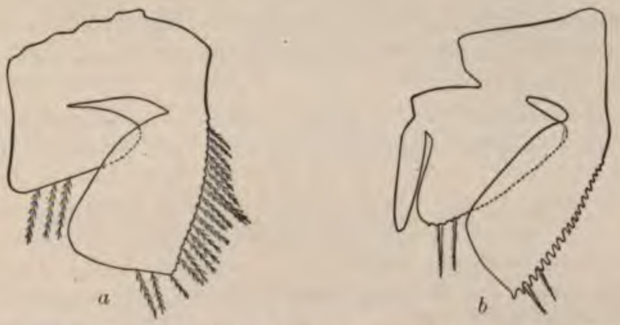

FIG. 333.—PARADYNAMENE BENJAMENSIS. *a*, FIRST PLEOPOD OF MALE. × 15½. *b*, SECOND PLEOPOD OF MALE. × 15½.

This species is named for Dr. Marcus Benjamin, editor of the Proceedings of the U. S. National Museum.

52. Genus CILICÆA Leach.

Last two segments of thorax of equal length.

Abdomen composed of two segments, the first of which is usually produced (at least in the male) in a long process directed backward. The last segment of the abdomen has a median posterior emargination, with or without teeth.

Maxillipeds with the second, third, and fourth articles of the palp produced into lobes.

Branches of the uropoda unlike in the male, the outer branch being incapable of folding under the inner branch; only the outer branch salient.

In the opinion of Dr. H. F. Moore and Prof. S. J. Holmes the males and females are unlike, the female being similar to the female of the genus *Dynamene*.

All the species which I have referred to this genus are without the long median spine or process of the first abdominal segment characteristic of the type species, *C. latreilli* Leach. The species of this genus described by Haswell[a] and Miers[b] also have the long spine. Haswell figures one specimen, which he supposes to be the female of *C. spinulosa* or of *C. hystrix*, which lacks the dorsal spine on the first abdominal segment, but in which the uropoda are similar to those of the male.

Miers says that the females of *Cilicæa latreilli* differ from the male in lacking the spine on the first segment of the abdomen and in having the uropoda with the inner branch produced and the outer branch short, resembling the uropoda of *Cymodoce*.

Milne Edwards[c] places *Cilicæa caudata* (Say) in the section of the genus *Næsa*, corresponding to *Cilicæa* Leach. It may be that a new genus will be required for these forms which lack the spine on the first abdominal segment, but until more is known about the sexes I shall, for the present, not remove them from the genus *Cilicæa*, where I originally placed them.

Whitelegge[d] refers to the genus *Cilicæa* several species in which the male has the first abdominal segment not produced in a long process.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CILICÆA.

a. Surface of body densely granulated.

  b. Terminal sinus of last abdominal segment without tooth on either side of the lateral angles of the sinus....................*Cilicæa linguicauda* Richardson

  b′. Terminal sinus of last abdominal segment with a tooth on either side of the lateral angles of the sinus....................*Cilicæa granulosa* Richardson

a′. Surface of body not granulated.

  b. Terminal segment of abdomen with three sinuses in a longitudinal series, each opening into the other, the two upper sinuses being heart-shaped. Outer branch of uropoda armed with four spines or teeth, and extending but little beyond the tip of the abdomen....................*Cilicæa cordata* Richardson

  b′. Terminal segment of abdomen with one sinus. Outer branch of the uropoda unarmed, and extending much beyond the tip of the abdomen.

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[a] Proc. Linn. Soc. New South Wales, VI, 1881, pp. 183–186.

[b] Zool. Collections of the *Alert*, 1884, pp. 308–310.

[c] Hist. Nat. Crust., III, 1840, pp. 218–219.

[d] Austral. Mus. Mem., IV, 1901, pp. 201–246.

c. Sinus with teeth.
  d. Sinus with four or six teeth.
    e. Sinus with six teeth. Medium tubercle at base of terminal segment double .... *Cilicæa gilliana* Richardson
    e′. Sinus with four teeth. Medium tubercle at base of terminal segment single .... *Cilicæa caudata* (Say)
  d′. Sinus with three teeth .... *Cilicæa sculpta* (Holmes)
c′. Sinus without teeth .... *Cilicæa carinata* Richardson

CILICÆA LINGUICAUDA Richardson.

Cilicæa linguicauda RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 536–537.

Locality.—Cape Catoche, Yucatan.

Depth.—24–25 fathoms.

Head subtriangular in shape; frontal margin with a small median point; eyes post-laterally situated. The first pair of antennæ reach the posterior margin of the first thoracic segment; the second pair touch the fourth segment.

The first segment of the thorax is a little longer than any of the others, which are similar in size. The epimera are distinct from the segments, and are produced into acute points, with the exception of the last, which has the epimera quite rounded.

The abdomen is composed of two segments, the first of which gives indication of three coalesced segments, and has a small tooth on each side on its post-lateral margin. The last segment is swollen anteriorly, and bears three low tubercles on this portion. The extremity of the abdomen is marked by a sinus, almost completely filled by a single large tooth, which is posteriorly triangular and extends beyond the lateral teeth formed by the sinus. This central tooth bears a small, pointed tubercle near its base. The uropoda are slightly incurved, and are somewhat longer than the abdomen.

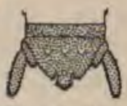

FIG. 334.—CILICÆA LINGUICAUDA. ABDOMEN.

The color is a dull yellow.

The lower part of each thoracic segment is densely granulated, as well as the whole surface of the abdomen. The edges of the segments and the uropoda are fringed with hairs.

Type.—Cat. No. 23908, U.S.N.M.

CILICÆA GRANULOSA Richardson.

Cilicæa granulosa RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 841; Ann. Mag. Nat. Hist., (7), IV, 1899, pp. 186–187.

Locality.—Cerros Island, Lower California.

Depth.—20 fathoms.

Surface of body densely granulated; granules large and close together.

Head with anterior margin thickened, and produced in a small median point, on either side of which the margin is lobed. Eyes situated post-laterally. First pair of antennæ extend to the posterior margin of the first thoracic segment; first joint of peduncle, oblong; second joint, short. Second pair of antennæ extend to the posterior margin of the third thoracic segment.

The first thoracic segment is longer than any of the following segments. The epimera are twice as broad as long.

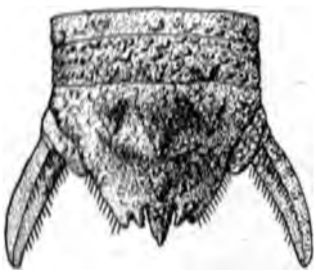

FIG. 330. CILICÆA GRANULOSA. LAST THORACIC SEGMENT AND ABDOMEN. × 8.

The first abdominal segment is short and bears indications of three coalesced segments. There are three transverse elevations on this segment which are densely covered with granules. The terminal segment bears three transverse elevations at the base, the median one terminating in a spine. On its posterior margin is a quadrangular excavation, with a long median tooth, bearing a spine at its extremity. At the base of the tooth is a small elevation. On either side of the terminal excavation, a short distance up the lateral margin, is a small spine. The fixed inner branch of the uropoda is small and short; the outer branch is long, blunt at the extremity, somewhat incurved, and reaches, when open, much beyond the terminal segment. The margins of the terminal segment, and the edges of the outer branch of the uropoda, are pubescent.

The legs are all simple, ambulatory.

One specimen from Cerros Island, Lower California, was collected by Mr. A. W. Anthony at a depth of 20 fathoms.

Type. Cat. No. 22649, U.S.N.M.

CILICÆA CORDATA Richardson.

[illegible] Richardson, Proc. U. S. Nat. Mus., XXI, 1899, pp. 839–840.
[illegible] Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 833.
[illegible] Richardson, Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 184–185.
[illegible] Richardson, Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 176–[illegible]
[illegible] Richardson, American Naturalist, XXXIV, 1900, p. 224.
[illegible] Richardson, Am. Naturalist, XXXIV, 1900, p. 223.
[illegible] Holmes, Proc. Cal. Acad. Sci. (3), III, 1904, pp. 302–303.

[illegible] Catalina Island, California; Popoff Island; Monterey Bay, California; Coronado Islands; Bodega Bay, California; Gualala, Mendocino County, California. Found in low water; dredged; in [illegible]

[illegible]

[illegible]

[illegible] has collected specimens [illegible] represent the two sexes of the same species. Similarity of habitat and coloration are the reasons he gives for this conclusion, together with the fact that all the specimens which he collected of the one were females and of the other males. An examination of the specimens at my disposition gives the same results in regard to the sexes. Still I place *Dynamene tuberculosa* with much hesitation in the synonymy of *Cilicæa cordata* as representing the female, inasmuch as several males of the genus *Dynamene* have been found which are in every respect similar to the females.

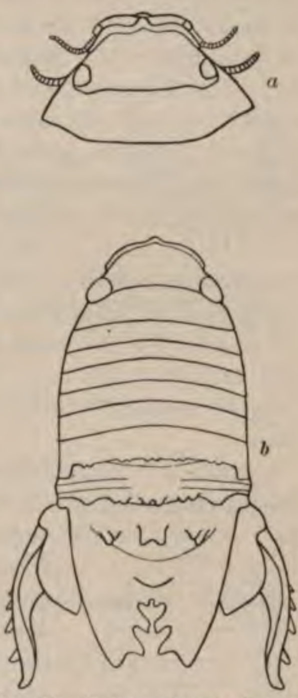

FIG. 336.—CILICÆA CORDATA (MALE). *a*, HEAD AND FIRST THORACIC SEGMENT. *b*, DORSAL VIEW. × 8.

Description of male.—Body attenuated in front; color a faint yellow, profusely marked with a delicate pink tint.

Head with the anterior margin thickened, and slightly produced in front. Prominent median point triangularly shaped. Frontal margin broadly lobed on either side of median point. Eye situated at post-lateral angle of head. First pair of antennæ reach beyond the posterior margin of head; first joint of peduncle oblong; second joint very short; flagellum consists of about nine articles. The second pair of antennæ extend to the posterior angle of the third thoracic segment; the flagellum consists of about fifteen articles.

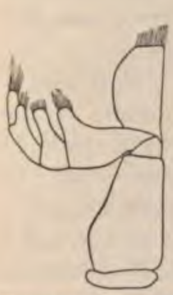

FIG. 337.—CILICÆA CORDATA. MAXILLIPED. × 27½.

The thoracic segments are about equal in length, with the exception of the first, which is a little longer than any of the others. The epimera are very broad and drawn out to an apex, which is rounded. They are scarcely visible in a dorsal view, as they project downward laterally, forming an angle with the segments. The last thoracic segment is furnished with low tubercles on its posterior margin.

On the first abdominal segment are five double tubercles. The terminal segment of the body has three sinuses, one above another, the two upper openings being heart-shaped. Six teeth are grouped in series of two each, and are placed in such regularity as to give the appearance of a triple sinus. At the base of the upper sinus is a large rounded tubercle, peaked at the top. Three double tubercles are also situated at the base of the abdomen. The inner branch of the uropoda is fixed and immovable it is broad and pointed at its extremity and extends two-thirds the length of the terminal segment. The outer branch is long and slender, broad and flattened above, more rounded and tapering at the extremity, somewhat incurved, and extends a little beyond the end of the abdomen. Its outer edge is crenulate and its under surface armed with four spines.

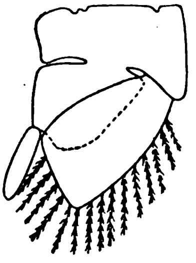

FIG. 338.—CILICÆA CORDATA. SECOND PLEOPOD OF MALE. × 15⅓.

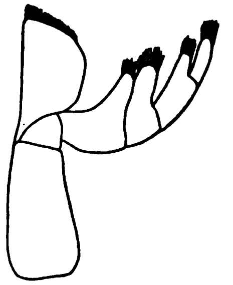

FIG. 339.—CILICÆA CORDATA (FEMALE). MAXILLIPED. × 51⅓.

The legs are long and slender, all ambulatory, and with dactylus biunguiculate.

Two specimens were collected at Popoff Island (Aleutian Islands) by Dr. W. H. Dall at low water.

Type.—Cat. No. 22575, U.S.N.M., Popoff Island.

Another individual was found at Catalina Island, California, by Dr. J. G. Cooper. In this specimen the sixth thoracic segment is also tuberculated. One specimen was found by Mr. Heath at Monterey Bay on the pink coralline at low tide, and is shaded with a delicate pink. In this specimen, on the seventh thoracic segment and the penultimate abdominal segment, the tubercles on either side of the median line of tubercles are single instead of double.

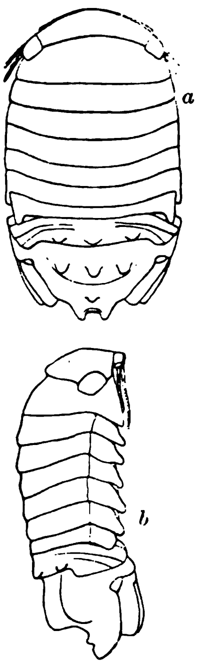

FIG. 340.—CILICÆA CORDATA (FEMALE). × 8. *a*, DORSAL VIEW. *b*, LATERAL VIEW.

Description of female.—Body oblong-ovate; color, light yellow, almost white; surface of abdomen tuberculated.

Head large, much broader than long, with a wide anterior margin, broadly curving on either side of a small median point. Eyes small, and situated at the extreme post-lateral angles of the head. The first pair of antennæ, composed of eight articles, reach beyond the middle of the first thoracic segment. The second pair of antennæ, composed of twelve articles, extend to the posterior angle of the first thoracic segment.

The first segment of the thorax is one and a half times longer than any of the other segments, which are about equal in length. The epimera, which are distinctly marked, and roundly produced at their posterior angles, are much broader than long.

The first abdominal segment is transversely crossed by three suture lines, indicated at the sides of the segment. Three small tubercles are situated in a transverse line on the posterior margin of this segment. The terminal segment is subtriangular in shape, with a broad funnel-like excavation at its extremity, formed by the infolding of the lateral edges. The anterior part of the terminal segment is very convex, upon which elevation are situated three large tubercles in a transverse row, the center one being in the median line. At the base of the terminal excavation is also a small tubercle. Both branches of the uropoda are similarly shaped, being of the same width throughout their entire length, and rounded posteriorly. The outer branch is somewhat shorter than the inner branch; neither reach the extremity of the abdomen.

Individuals were found at Gualala, California, on *Haliotis rufescens*, by Dr. R. E. C. Stearns; also, one specimen at Catalina Harbor, California, and one at Popoff Island, Aleutian Islands, at low water, by Dr. W. H. Dall.

Type.—Cat. No. 22569, U.S.N.M. Popoff Island, Aleutian Islands.

CILICÆA GILLIANA Richardson.

Cilicæa caudata gilliana RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 840–841; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 185–186; American Naturalist, XXXIV, 1900, p. 224.

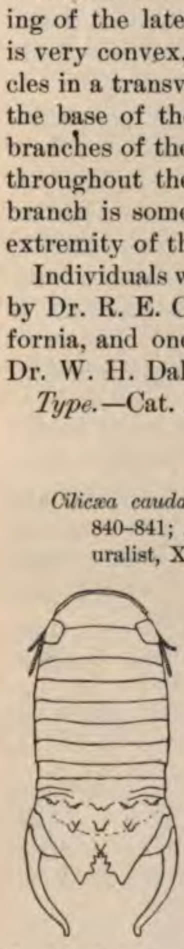

FIG. 341.—CILICÆA GILLIANA. × 8.

Localities.—Catalina Island, California; Gualala, Mendocino County, California.

Depth.—30–40 fathoms in sandy mud.

Body slightly attenuated in front. Color, light brown with markings of black.

Head with anterior margin thickened and slightly produced. Large median point triangularly shaped, on either side of which the frontal margin of the head is broadly lobed. Eye situated at the posterior angles of the head. F pair of antennæ reach beyond the posterior margin of the head; first joint of peduncle is oblong; second joint very small; flagellum consists of eight joints. The second pair of antennæ are broken in the specimens examined.

The thoracic segments are about equal in length, with short but very broad epimera, which extend downward laterally, forming an angle with the segments. The last segment is ridged with very low tubercles on its posterior margin.

The first abdominal segment has two suture lines, indicative of coalesced segments, and bears five double tubercles. The terminal segment has a large sinus, in wh are situated six sharp teeth. At the base of the sinus is a la

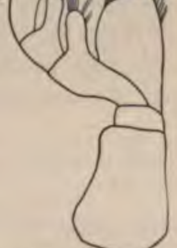

FIG. 342.—CILICÆA GILLIANA. MAXILLIPED. × 51⅓.

tubercle. Three double tubercles are also found at the base of the terminal segment. The inner branch of the uropoda is affixed to the sides of the abdomen and extends two-thirds of its length; it is triangularly pointed at its extremity. The outer branch is long and slender, almost cylindrical in shape, smooth, somewhat incurved, and extends much beyond the tip of the terminal segment.

The legs, all ambulatory, are slender with dactylus uniunguiculate.

Specimens were dredged off Catalina Island, California.

Type.—Cat. No. 22576, U.S.N.M.

These specimens differ from *Cilicæa caudata* (Say), in the presence of six distinct teeth within the sinus of the terminal segment, while in that species there are but four; in the greater development of the spine at the base of the sinus, and in the median double tubercle at the base of the terminal segment.

This species is named in honor of Dr. Theodore Gill, the distinguished icthyologist.

CILICÆA CAUDATA (Say).

Næsa caudata SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 482.—MILNE EDWARDS, Hist. Nat. Crust., III, 1840, p. 219.

Cymodocea caudata IVES, Proc. Acad. Nat. Sci. Phila., 1891, p. 188, pl. VI, figs. 11–14.

Cymodocea bermudensis IVES, Proc. Acad. Nat. Sci. Phila., 1891, p. 194.

Cilicæa caudata RICHARDSON, Proc. U. S. Nat. Mus., XXI, p. 841 (foot-note); Ann. Mag. Nat. Hist., (7), IV, 1899, p. 186 (foot-note); Proc. U. S. Nat. Mus., XXIII, 1901, p. 536.

Dynamene bermudensis RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 534; Trans. Conn. Acad. Sci. XI, 1902, p. 291.

Cilicæa caudata RICHARDSON, Trans. Conn. Acad. Sci., XI, 1902, p. 291.—MOORE, Bull. U. S. Commissioner of Fish and Fisheries, XX, Pt. 2, 1902, p. 172, pl. x, figs. 5–8.

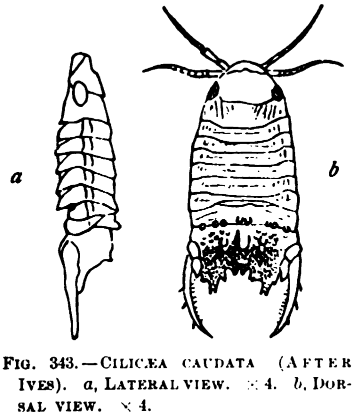

FIG. 343.—CILICÆA CAUDATA (AFTER IVES). *a*, LATERAL VIEW. × 4. *b*, DORSAL VIEW. × 4.

Localities.—Egg Harbor, New Jersey; Beaufort, North Carolina; No Name Key, Florida; between Salt Pond Key and Stock Island; Key West; Puntarassa; Sugarloaf Key; northwest end St. Martins Reef; Sarasota Bay, Florida; Cedar Keys, Florida; off Progreso and Cape Catoche, Yucatan; Bermudas, at Harrington Sound, Castle Harbor, and the Flatts; Mayaguez, Boqueron Bay, Puerto Real, Arroyo, and Fajardo, Porto Rica; the Bahamas.

Depth.—Found on the surface; also at a depth of 1–12 feet; 25 fms. Among algæ and grass below low tide; from coral reefs.

On the authority of Dr. H. F. Moore, who has collected specimens of this species, *Dynamene bermudensis* represents the female of *Cilicæa caudata* (Say). The two forms are always found associated together. Only the female of the one is known and the male of the other. I unite the two with much hesitancy, for, inasmuch as the males of several species of *Dynamene* are known, the male of this form may not be the one referred to it by Doctor Moore.

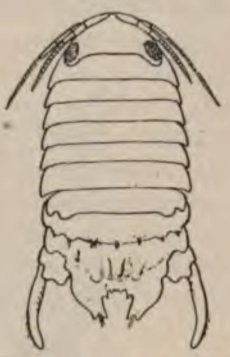

FIG. 344.—CILICÆA CAUDATA (MALE) (AFTER MOORE). × 53.

Description of male.—Body very slightly increasing in width from the head to the abdomen, a little more than twice as long as wide from the anterior margin of the head to the extremity of the abdomen, 4 mm.: 9 mm. The uropoda extend 1 mm. beyond the tip of the terminal segment, making the entire length of the body with the uropoda 10 mm.

Head three times as wide as long, 1 mm.: 3 mm., with a frontal border arising between the eyes, and produced in a small median point. The eyes are small, round, composite, and situated in the postlateral angles of the head. The first pair of antennæ have the basal article long and stout; the second is half as long as the first and equally wide; the third is one and a half times as long as the second and about half as wide. The flagellum is composed of eight articles. The first antennæ extend to the posterior margin of the first thoracic segment. The second pair of antennæ have the basal article short; the second is about twice as long as the first; the third and fourth are about equal in length and each is a little longer than the second; the fifth is a little longer than the fourth. The flagellum is composed of fifteen articles. The second antennæ extend a little beyond the posterior margin of the second thoracic segment. The maxilliped has a palp of five articles. The palp of the mandibles is composed of three articles. The frontal lamina is large and conspicuous, the posterior portion forming a thick raised margin in the shape of an inverted v.

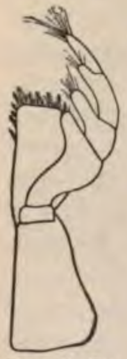

FIG. 345.—CILICÆA CAUDATA. MAXILLIPED. ×51⅓.

The first segment of the thorax is nearly twice as long as any of those following. The lateral parts of all the segments are bent downward, forming an angle with the dorsal part of the segment. The epimera are not distinct from the segments, but are indicated by a depression on either side of the segment a little distance within the place where the lateral part of the segment bends downward. The posterior extremity of the lateral margin or the outer post-lateral angle is slightly produced.

The abdomen is composed of two segments. The first segment has two suture lines on either side indicating partly coalesced segments. Its posterior margin has five low tubercles, two on either side of a median one, and each with a groove in the center from which extends a long movable spine-like bristle. The terminal segment has the convex anterior half provided with one large median tubercle with a groove in the center from which extends a bunch of hairs. On either side of this median tubercle is a row of two large tubercles in longitudinal series, the lower one in each series being in a transverse line with the median tubercle. Below this transverse row of three tubercles and almost hidden by them are three small tubercles in a transverse row and much closer together than those directly above them. The posterior half of the terminal segment is deeply excavate, the post-lateral angles being very acute. Within the excavation are four acute teeth, two on either side of the center. The post-lateral angles have a small rudimentary tooth on the inner side near the extremity. The fixed immovable branch of the uropoda extends only half the length of the terminal segment. The outer movable branch is long and narrow and is curved inward, so that when folded its extremity meets that of the branch of the opposite side in the median line of the body. The outer branch is furnished on its exterior margin with bunches of hairs scattered here and there.

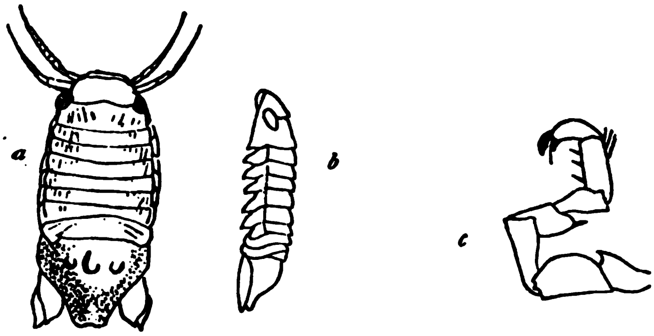

FIG. 346.—CILICÆA CAUDATA (FEMALE) (AFTER IVES). a, DORSAL VIEW. × 4. b, LEFT SIDE. × 4. c, FOURTH LEG OF RIGHT SIDE.

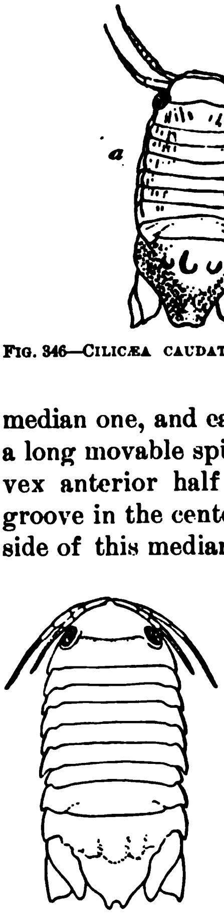

FIG. 347.—CILICÆA CAUDATA (FEMALE) (AFTER MOORE). × 8.

The legs are all ambulatory. On each segment of the thorax there are seven bunches of a few hairs, forming seven longitudinal series on the thorax.

Description of female.—Body ovate, twice as long as wide, 3 mm.: 6 mm.

Head nearly three times as wide as long, 1 mm.:3 mm., with a frontal border arising between the eyes and produced in a small median point. The eyes are small, round, composite, and situated in the post-lateral angles of the head. The first pair of antennæ have the basal article long and stout; the second article is less than half as long as the first and is of equal width; the third is twice as long as the second and half as wide. The flagellum is composed of ten articles. The first antennæ extend almost to the posterior margin of the first thoracic segment. The basal article of the second antennæ is very short; the second is twice as long; the third is one and a half times longer than the second; the fourth is a little longer than the third; the fifth is a little longer than the fourth. The flagellum is composed of twelve articles. The second pair of antennæ extend to the posterior margin of the second thoracic segment. The maxilliped has a palp of five articles. The palp of the mandibles is composed of three articles. The frontal lamina is large and conspicuous and has a V-shaped raised margin pointing anteriorly.

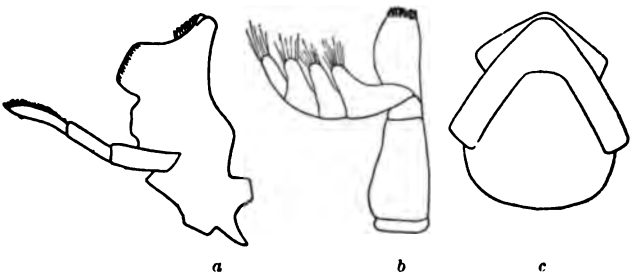

FIG. 348.—CILICÆA CAUDATA (FEMALE). *a*, MANDIBLE. × 51⅓. *b*, MAXILLIPED. × 51⅓. *c*, FRONTAL LAMINA AND CLYPEUS. × 51⅓.

The first segment of the thorax is twice as long as any of the others. The epimera are not distinct from the segments, but a lighter area and a slight depression marks the place of coalescence. The lateral margins are straight, with the outer post-lateral angle slightly produced.

The abdomen is composed of two segments. The first segment is as long as the first thoracic segment, and has three suture lines on either side, indicating as many coalesced segments. The terminal segment has the anterior convex portion surmounted with three tubercles in a transverse row, the middle one being in the median longitudinal line. The shape of the segment is somewhat triangular, with the bluntly rounded apex produced, the sides of the extremity folding under to form a groove, which is incomplete on the ventral side. The immovable inner branch of the uropoda extends two-thirds the length of the terminal segment; it is truncate at the extremity. The movable outer branch is as wide and as long as the inner branch, and has the outer posterior angle slightly produced and acute, the inner angle being rounded.

The legs are all ambulatory.

CILICÆA SCULPTA (Holmes).

Dynamene sculpta Holmes, Proc. Cal. Acad. Sciences (3), III, No. 11, 1904, pp. 300–302, pl. xxxiv, figs. 1–7.

Localities.—San Clemente Island; San Diego, California.

Found in pieces of sponge dredged in shallow water.

"Body increasing slightly in width posteriorly. Head narrowed and scarcely longer than the first segment of the thorax. Eyes oblong, situated on prominent, rounded, lateral lobes. Thoracic segments minutely roughened behind, the lateral angles produced backward into subacute, triangular processes; first segment longer than the succeeding ones, the lower side produced forward into a triangular process extending a little in advance of the eye and backward into a triangular, acute lobe at the postero-inferior angle; last three segments with several small setose prominences on the posterior margin. Abdomen large, with five segments indicated, the anterior segment marked off by a line extending entirely across the upper surface; the three following segments are indicated by two pairs of lines which are visible only at the sides; second segment furnished with three setose tubercles in a transverse row. Caudal shield large and sculptured,

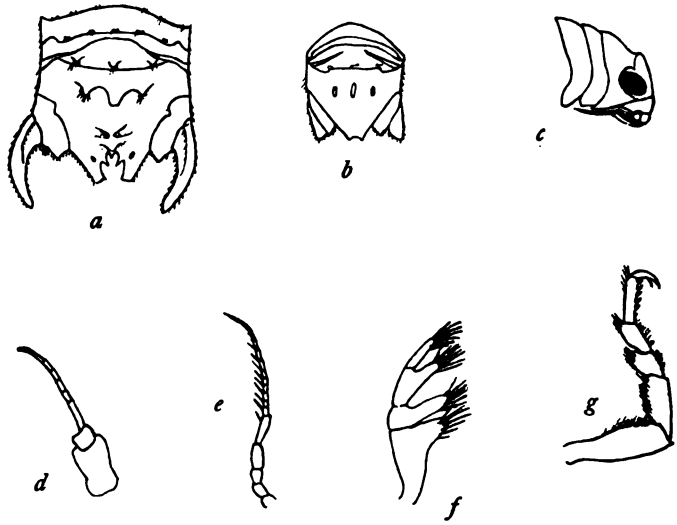

FIG. 349.—CILICÆA SCULPTA (AFTER HOLMES). *a*, ABDOMEN OF MALE. *b*, ABDOMEN OF FEMALE. *c*, HEAD OF MALE (LATERAL VIEW). *d*, FIRST ANTENNA OF MALE. *e*, SECOND ANTENNA OF MALE. *f*, MAXILLIPED OF MALE. *g*, LAST THORACIC LEG OF MALE.

the anterior portion with three tubercles, the middle one rather blunt and a little in advance of the others; a pointed tubercle with two lateral ridges in front of the posterior notch; notch deep, with a small spine at the end, behind which is a pair of larger spines. Inner branch of the uropods flattened and not nearly reaching the tip of the caudal shield, the tip subacute; outer branch very long, narrow, and incurved, extending considerably behind the tip of the caudal shield and directed obliquely upward. First antennæ a little shorter than the second, the first basal joint enlarged, oblong, and emarginate at the distal end at the insertion of the small, subquadrate second joint; flagellum longer than the peduncle and composed of nine to eleven joints. Second antennæ scarcely reaching the middle of the thorax, the peduncle slender, the last two joints much longer than the preceding ones; flagellum a little longer than the peduncle, the joints furnished with short setæ. Thoracic legs increasing slightly in length posteriorly and furnished with short hairs; propodi armed below with spines; dactyls curved and ending in a spine with a strong spine behind the tip.

"The females are smaller than the males; the head, antennæ, mouth parts, thoracic legs, and anterior segments are not distinguishable from those of the male, but the abdomen is markedly different. The caudal shield is relatively smaller and less sculptured; the notch at the extremity is simple and shallow; there are three oblong tubercles on the anterior portion; the three tubercles on the next segment in front are smaller than in the male. The branches of the uropods are flattened and of subequal size; neither extends beyónd the tip of the caudal shield."—HOLMES.[a]

CILICÆA CARINATA Richardson.

Cilicæa carinata RICHARDSON, American Naturalist, XXXIV, 1900, p. 224; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 535–536.

Locality.—Coast of Georgia.

Depth.—440 fathoms.

Head with a median projection on the anterior margin, produced forward in the form of a large tubercle. Eyes colorless. First pair of antennæ reach the posterior margin of the head; flagellum eight-jointed. Second pair of antennæ reach the posterior margin of the first thoracic segment.

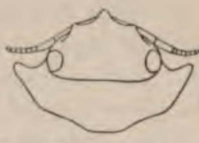
FIG. 350.—CILICÆA CARINATA. HEAD.

The segments of the thorax are roughly granulated. A transverse median ridge or elevation appears on each of the segments, giving the dorsum, from a lateral view, a very rugged appearance. The epimera are rough and are drawn out laterally in very acute angles.

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[a] Proc. Cal. Acad. Sciences (3), III, 1904, pp. 300–301.

The abdomen is composed of two segments, the first segment being formed of several coalesced segments, as indicated by two suture lines. In the center of this segment are two longitudinal ridges, placed obliquely, so as almost to meet anteriorly and to spread apart at the other extremity. This segment projects down over the last segment at either side. The last segment has a deep excavation at its posterior extremity, around and above which is a carinated ridge extending entirely around the whole of the posterior half of the segment. Two small longitudinal ridges are in the center of the segment. The inner branch of the uropoda is very short, not reaching the extremity of the abdomen by some distance; it is quadrangular in shape, with sides nearly parallel, and obliquely truncated at the end. The outer branch of the uropoda is long, curved, and pointed at the end, resembling a hook somewhat.

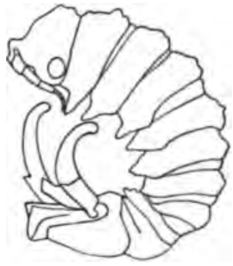

FIG. 351.—CILICÆA CARINATA. LATERAL VIEW.

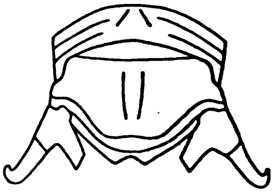

FIG. 352.—CILICÆA CARINATA. ABDOMEN.

The color is a light yellow. In appearance the little isopod is very rough and rugged looking.

There is but one specimen, which was found off the coast of Georgia.

Depth.—440 fathoms.

Type.—Cat. No. 23907, U.S.N.M.

Family XII. SEROLIDÆ.

Body strongly depressed.

Both pairs of antennæ multiarticulate with well-defined peduncle and flagellum. Mandible with palp. Maxillipeds with a triarticulate palp. Head posteriorly fused with first thoracic segment.

Seventh thoracic segment entirely wanting on dorsal side.

Abdomen composed of four segments, three anterior to the large terminal segment.

Uropoda lateral, with both branches free and subequal. First two pairs of legs subchelate in male, second pair smaller than first; only first pair subchelate in female; last pair of legs smaller than any of the preceding pairs.

First three pairs of pleopods natatory; fourth and fifth pairs branchial; outer branch of fourth pair forming an operculum.

Marsupium consists of four pairs of plates.

53. Genus SEROLIS Leach.

With characters of family.

Only genus known.

SEROLIS CARINATA Lockington.

Serolis carinata Lockington, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 36.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 842; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 187; American Naturalist, XXXIV, 1900, p. 224.

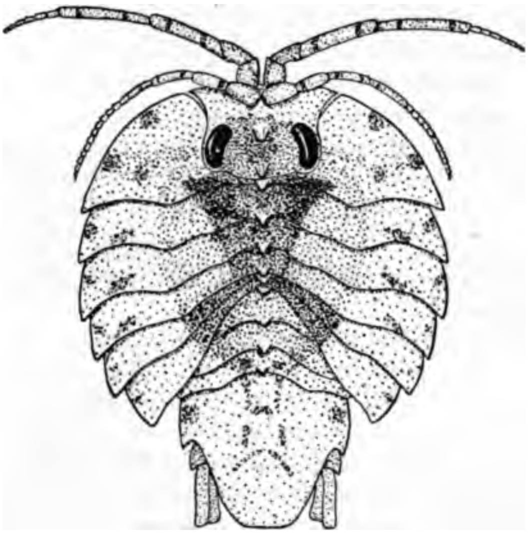

Fig. 353.—Serolis carinata. × 8⅓.

Locality.—San Diego, California.

Body almost round, very much flattened, and nearly as broad as long, 5 mm : 6 mm.

Head about as wide as long and deeply set in the first thoracic segment, with which it is fused posteriorly. The eyes are large, oval, and composite, and situated in the post-lateral angles of the head. The anterior margin of the head is bisinuate on either side of a small median point. The basal article of the first pair of antennæ is lar

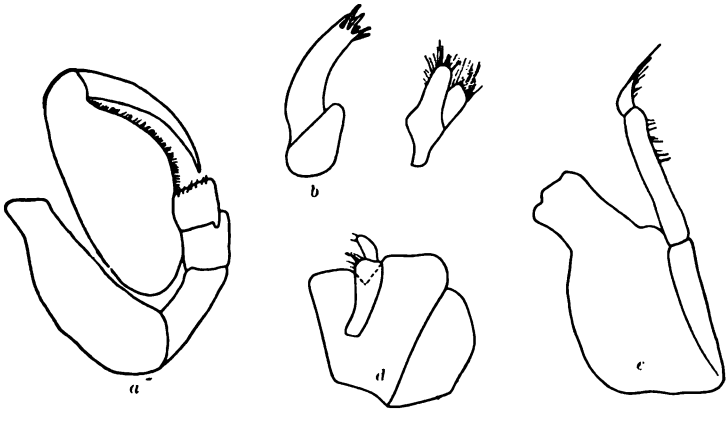

Fig. 354.—Serolis carinata. *a*, First leg. × 27. *b*, First maxilla. × 51⅓. *c*, Second maxilla. × 51⅓. *d*, Maxilliped. × 51⅓. *e*, Mandible. × 51⅓.

and somewhat dilated; the second article is nearly twice as long as the first, and is also somewhat dilated; the third article is as long as the second, but more slender; the fourth article is almost as long as the third. The flagellum is composed of five articles. The first antennæ extend to the posterior margin of the first thoracic segment or to the end of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short and is not visible from a dorsal view; the second article is about twice as long as the first; the antennæ are geniculate between the second and third articles; the third article is about as long as the second; the fourth is twice as long as the third; the fifth is one and a half times longer than the fourth. The flagellum is composed of seven articles. The second antennæ extend to the posterior margin of the second thoracic segment. The maxilliped has a palp of three articles. The palp of the mandibles is composed of three articles.

The first segment of the thorax is fused with the posterior portion of the head along the posterior margin. The lateral portions of the segment are widely expanded and surround the head, the antero-lateral angles extending to the anterior margin of the head. The five following segments are free, with the lateral parts widely expanded and subequal. The first segment and the last two (the fifth and sixth) are very much shorter in the median longitudinal line than the intermediate ones. The seventh segment is entirely wanting on the dorsal side. The epimera are not distinct from the segments, but are perfectly coalesced, with no indication of the place of fusion.

The abdomen is composed of four segments, the first three of which are short and subequal in length. The lateral parts of the first two are covered by the widely produced lateral parts of the last thoracic segment. The fourth or terminal segment of the abdomen is large, somewhat triangular in shape, with apex obtusely rounded. A little more than one-third the distance from the base to the apex is a sharp tooth on either side, below which the abdomen becomes more attenuated. The peduncle of the uropoda arises at this point on the ventral side. The peduncle of the uropoda extends to about the middle of the lateral margin of the terminal abdominal segment. The branches are subequal in length and of equal width. They are rounded posteriorly, somewhat crenulate on the lateral margins, and extend a short distance beyond the tip of the terminal segment.

The first pair of legs are subchelate, with propodus greatly dilated. All the other six pairs of legs are ambulatory. In the male the first two pairs of legs are subchelate, the second pair being smaller than the first. There are five pairs of pleopoda, one pair for each of the first three segments; the fourth pair have the outer branch forming an operculum folding over the entire ventral side of the last segment and attached at the anterior end, being free elsewhere; the fifth pair are concealed under the operculum.

III. IDOTHEOIDEA or VALVIFERA.

Uropoda lateral, valve-like, ventrally placed, closing over the five pairs of branchial pleopoda being attached on the outer margins to the sides of the terminal segment and opening and closing like folding doors. Legs of the first pair not cheliform.

ANALYTICAL KEY TO THE FAMILIES OF IDOTHEIOIDEA.

a. Body narrow, elongate, somewhat cylindrical, scarcely depressed. Four anterior pairs of legs unlike the three posterior ones, not ambulatory, nor strictly prehensile, directed forward, slender, ciliated, the first pair very small and closely applied to the mouth parts; last three pairs stouter and ambulatory with terminal joint bifid .... Family XIII. ARCTURIDÆ

a′. Body more or less broad, depressed. Legs usually nearly alike and ambulatory, but first three pairs sometimes pronouncedly subcheliform in structure .... Family XIV. IDOTHEIDÆ

Family XIII. ARCTURIDÆ.

Body narrow, elongate, somewhat cylindrical, scarcely depressed. First antennæ with the flagellum uniarticulate. Second antennæ strongly developed, the peduncle having the last two articles very much elongated and geniculate at the articulation of the joints; the flagellum is short. Segments of the abdomen more or less consolidated, the last one being rather large. The four anterior pairs of legs are unlike the three posterior pairs, are neither ambulatory nor strictly prehensile, are directed forward, slender, feeble in structure, ciliated with long delicate hairs, the first pair being very small and applied to the mouth parts. Last three pairs of legs stouter and ambulatory with terminal joint bifid.

Mandibles always without palps.[a]

ANALYTICAL KEY TO THE GENERA OF THE FAMILY ARCTURIDÆ.

a. Fourth segment of thorax greatly longer than any of the others. Marsupium of female consists of two plates affixed to this segment..Genus *Astacilla* Cordiner

a′. Fourth segment of thorax not greatly longer than any of the others. Marsupium of female composed of three pairs of plates.

  b. Abdomen composed of three distinct segments, two short ones anterior to the terminal segment..Genus *Arcturus* Latreille

  b′. Abdomen composed of two distinct segments, one anterior to the terminal segment..Genus *Pleuroprion* zur Strassen

54. Genus ASTACILLA Cordiner.

Body slender, cylindrical in form, with the fourth segment of the thorax very much elongated. Epimera small but distinct on all the thoracic segments with the exception of the first. Marsupium of female consists of two plates affixed to this segment. Abdomen composed of only two segments, a single short segment anterior to the terminal one, which is conically produced.

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[a] See Sars for characters of family, Crust. of Norway, II, 1899, p. 86.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ASTACILLA.

a. With eyes. Head excavate in front, without rostriform point. Fourth thoracic segment subcylindrical. Terminal abdominal segment with a prominent, subacute tooth on each side above the middle, directed outward and backward; extremity obtuse ....*Astacilla granulata* (G. O. Sars)

a′. Without eyes. Head with a rostriform point in front, between the antennulæ. Fourth thoracic segment wider at the anterior end, and tapering to the posterior end. Terminal abdomonial segment with a pair of teeth on each side; extremity acute ....*Astacilla cæca* Benedict

ASTACILLA GRANULATA (G. O. Sars).

Leachia granulata G. O. Sars, Arch. Math. Nat., II, 1877, p. 351 (251).

Astacilla americana Harger, Am. Jour. Sci. (3), XV, 1878, p. 374.

Astacilla granulata Harger, Proc. U. S. Nat. Mus., II, 1879, p. 161.—Sars, Norw. North Atlantic Exp., Crust., 1885, p. 107, pl. IX, figs. 27–35.—Harger, Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 364–367, pls. VIII–IX, figs. 48–52.—Hansen, Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 189–190.—Benedict, Proc. Biol. Soc. Washington, XII, 1898, p. 50.—Richardson, American Naturalist, XXXIV, 1900, p. 230; Proc. U. S. Nat. Mus., XXIII, 1901, p. 550.—Norman, Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 448.

Localities.—Georges Banks; Banquereau; Miquelon Island, south of Newfoundland; latitude 69° 16′ north, longitude 58° 8′ west; latitude 70° north, longitude 58° 38′ west; latitude 71° 10′ north, longitude 58° 56′ west; latitude 72° 41′ north, longitude 59° 50′ west; also between Norway and Iceland; Grand Banks; latitude 60° 31′ north, longitude 9° 18′ west; latitude 60° 21′ north, longitude 5° 41′ west.

Depth.—7–640 fathoms.

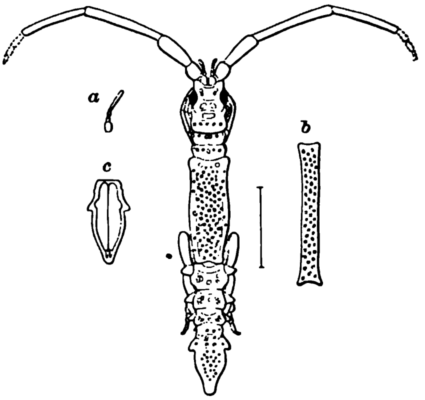

Fig. 355.—Astacilla granulata (after Harger). *a*, First antenna of male. + 4. *b*, Fourth thoracic segment of male. + 4. *c*, Ventral side of abdomen. × 4.

Body narrow, elongate, about six and a half times longer than wide, 2½ mm. : 16 mm., not including the antennæ.

The head is as wide as long, 2 mm. : 2 mm., with the anterior margin deeply excavate. The eyes are small, round, composite, and situated at the sides of the head, halfway between the anterior and the posterior margins. The first pair of antennæ have the basal article long and somewhat dilated; the two following articles are short and slender, the two together being as long as the first article; the fourth or last article is a little longer than the first. The first antennæ extend to the end of the second article of the peduncle of the second antennæ. The basal article of the second antennæ is short, and does not extend beyond the antero-lateral angles of the head; the second article extends to the end of the first pair of antennæ; the third article is three times as long as the second article; the fourth is twice as long as the third; the fifth is a little shorter than the fourth. The flagellum is composed of three articles. The second antennæ are not quite as long as the body, being 14 mm. in length. The maxilliped has a palp of five articles. The palp of the mandibles is wanting.

The first segment of the thorax is a little longer than the two following segments, which are subequal. The fourth segment is extremely long, being 6 mm. long, or 1 mm. longer than all the other six segments taken together. This segment is broader anteriorly than the preceding segments; at its posterior extremity it becomes abruptly narrower. The fifth segment is about one-sixth as long as the fourth segment; the sixth segment is about equal in length to the fifth; the seventh is a little shorter than the sixth. The lateral parts of the first segment are broadly expanded and surround the posterior portion of the head, the antero-lateral angles extending as far as the eyes. The epimera are distinctly separated on all the six following segments. On the second and third segment they are small and occupy the whole of the lateral margin. On the fourth segment they occupy the antero-lateral angles. In the last three segments they project at the sides in acutely pointed processes.

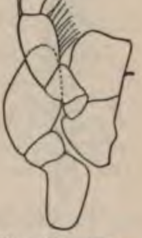

FIG. 356.—ASTACILLA GRANULATA. MAXILLIPED. × 27½.

The first two segments of the abdomen are short. The terminal segment is long and narrow, about one-fifth the entire length of the body, being 3 mm. long. It is produced to a narrow, obtuse extremity. Near the base there is a transverse depression marked at the sides by an acute process or expansion of the lateral margin.

The first four pairs of legs are slender, directed forward, densely covered with long hairs on the inferior margins of all the articles. The first pair are much shorter than the three following pairs, which are gradually increasingly longer. The last three pairs of legs are ambulatory and gradually decrease in length.

The whole surface of the body is covered with small granulations. On the posterior portion of the dorsal surface of the head are two low tubercles. The three last segments of the thorax have each one low tubercle in the median longitudinal line. The first two segments of the abdomen have each two low tubercles, one on either side of the median longitudinal line. The terminal segment has a double row of six low tubercles in two longitudinal series, one row on either side of the median line.

ASTACILLA CÆCA Benedict.

Astacilla cæca Benedict, Proc. Biol. Soc. Washington, XII, 1898, p. 51.—Richardson, American Naturalist, XXXIV, 1890, p. 230; Proc. U. S. Nat. Mus., XXIII, 1901, p. 550.

Locality.—Latitude 38° 22′ north, longitude 70° 17′ 30″ west (south of Marthas Vineyard).

Depth.—1,825 fathoms.

Body narrow, elongate, five times longer than wide, 2 mm.: 9½ mm.

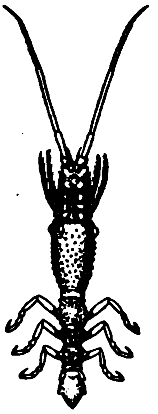

Fig. 357.—Astacilla cæca (after Benedict).

Head wider than long, 1 mm. : 1½ mm., with the anterior margin deeply excavate between the produced antero-lateral angles, and a small median point within the excavation. The lateral margin on either side is produced in two acute triangular processes, an anterior and a posterior lobe. The eyes are wanting. There are two tubercles on the head situated in the median line, one on the anterior portion and the other on the postcephalic lobe. The first pair of antennæ have the basal article long and dilated; the second and third articles are subequal in length, slender, and both together about equal in length to the basal article; the fourth article is one and a half times longer than the third. The first antennæ extend a little beyond the end of the second article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short and inconspicuous in a dorsal view, being covered by the basal article of the first antennæ; the second article extends as far as the middle of the fourth article of the first antennæ; the third article is twice as long as the second; the fourth is twice as long as the third; the fifth is a little shorter than the fourth. The flagellum is composed of five articles. The second antennæ are 6 mm. in length.

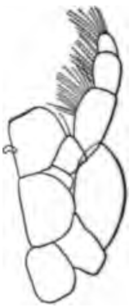

Fig. 358.—Astacilla cæca. Maxilliped. × 39.

The first three segments of the thorax are subequal in length; the fourth segment is six times longer than the third, being 3 mm. in length; the fifth, sixth, and seventh segments decrease gradually in length, the fifth segment being about 1 mm. long. There is one median tubercle on each of the thoracic segments; other small tubercles are situated in a transverse line lateral to the median tubercle on the first three segments; the fourth segment is thickly covered with small tubercles over the whole dorsal surface; the fifth segment has a pair of tubercles one above the other on either side of the lateral margin anterior to the epimera; the sixth segment has one tubercle on either side anterior to the epimera. The epimera of the second, third, and fourth segments are small; those of the last three segments are angular and conspicuous. The fourth segment of the thorax is twice as wide at its anterior end as it is at its posterior extremity; it measures 2 mm. in width at the anterior portion and only 1 mm. at the posterior end.

The abdomen is composed of two segments, the first one of which is short and narrow. The terminal segment has the lateral margins produced on either side in two angular processes, one at the base of the segment and the other a little below the middle. The segment terminates in an acute point. There is also a median tubercle on each one of the abdominal segments, the tubercle on the terminal segment being situated at the base of the segment.

The marsupial plates are covered with small tubercles.

55. Genus ARCTURUS Latreille.

Body slender, somewhat cylindrical in form, with the fourth segment of the thorax not greatly longer than the others. Epimera small but distinct on all the thoracic segments with the exception of the first. Marsupium of female composed of three pairs of plates issuing from the second, third, and fourth segments. Abdomen composed of three segments, two segments anterior to the large terminal one.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ARCTURUS.

- *a.* End of terminal segment notched, as seen from above.
  - *b.* Body smooth and free from spines................*Arcturus beringanus* Benedict
  - *b′.* Body spiny....................................*Arcturus longispinis* Benedict
- *a′.* End of terminal abdominal segment without notch.
  - *b.* Body without spines or tubercles, perfectly smooth and glabrous. *Arcturus glaber* Benedict
  - *b′.* Body with spines or tubercles.
    - *c.* Terminal segment of abdomen armed with a long median terminal spine, projecting beyond the end of the segment.
      - *d.* Head with two spines. Second joint of second pair of antennæ armed with one spine at upper end. Thorax with few spines. Surface of terminal abdominal segment smooth.
        - *e.* Second joint of peduncle of second pair of antennæ without spine at base on outer margin. First pair of antennæ extending one-third the length of the third joint of second pair of antennæ. Dorsal spines wanting on second abdominal segment. Spines wanting on opercular valves. Anterior thoracic appendages furnished with a number of spines on the proximal joints......................*Arcturus purpureus* Beddard
        - *e′.* Second joint of peduncle of second pair of antennæ with spine at base on outer margin. First pair of antennæ extending two-thirds the length of the third joint of second pair of antennæ. Dorsal spines present on second abdominal segment. Spines present on opercular valves. Anterior thoracic appendages without spines except on penultimate joint...............................*Arcturus caribbæus* Richardson
      - *d′.* Head with eight spines. Second joint of second pair of antennæ armed with three spines at the upper end. Thorax with many spines. Surface of terminal abdominal segment with three rows of spines on dorsa surface. Row of spines on each opercular valve. *Arcturus floridanus* Richardson

c′. Terminal segment of abdomen not armed with a long median terminal spine.
  d. Four anterior segments of thorax with spines or tubercles. Middle surface of abdomen with prominent spiny projections. With conical lateral projections. Epimera pointed.......................*Arcturus baffini* (Sabine)
  d′. Four anterior segments of thorax without spines or tubercles. Middle surface of abdomen without any indication of prominent spiny projections. Without conical lateral projections. Epimera less pointed. *Arcturus baffini* var. *tuberosus* Sars

ARCTURUS BERINGANUS Benedict.

Arcturus beringanus BENEDICT, Proc. Biol. Soc. Washington, XII, 1898, pp. 46–47.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 854; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 275; American Naturalist, XXXIV, 1900, p. 229.

Localities.—Alaska; Bering Sea.

Depth.—29–72 fathoms.

Body narrow, elongate, a little more than seven times longer than wide. 1½ mm.: 11 mm., not including the antennæ.

The head is about as wide as long, 1½ mm.: 1½ mm., with the anterior margin deeply excavate. The eyes are small, round, composite, and situated at the sides of the head about halfway between the anterior and posterior margins. The first pair of antennæ have the basal article long and somewhat dilated; the second is longer than the third, and both together are about equal in length to the first; the fourth is a little longer than the first. The first antennæ extend to the end of the second article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short, and extends as far as the antero-lateral angles of the head, or to the end of the first article of the first pair of antennæ; the second article is longer and extends to the end of the first pair of antennæ; the third article is twice as long as the second; the fourth is twice as long as the third; the fifth is a little shorter than the fourth. The flagellum is composed of four articles, the last article terminating in a spine. The second antennæ are shorter than the body, being only 7½ mm. in length. The maxilliped has a palp of five articles. The palp of the mandibles is wanting.

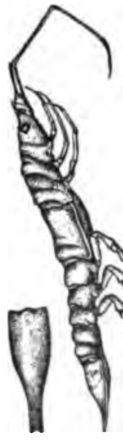

FIG. 359.—ARCTURUS BERINGANUS (AFTER BENEDICT). × 2¼.

The first three segments of the thorax are subequal; the fourth is twice as long as any of the preceding segments; the fifth is half as long as the fourth; the sixth is as long as the fifth; the seventh is a little shorter than the sixth. The first segment has the lateral parts somewhat expanded to surround the posterior portion of the head. The epimera of the second, third, and fourth segments are distinctly separated from the segments, are small and narrow, not visible from a dorsal view, and occupy the antero-lateral angles of the segments. The epimera of the last three segments are also distinctly separated from the segments, are conspicuous from a dorsal view, and are produced at the sides in processes which are rather blunt at their extremities.

The first two segments of the abdomen are short. The terminal segment is long and produced to an extremity which has a V-shaped excavation. The length of the terminal segment is a little less than one-fourth that of the entire body, being 3 mm. long. Near the base is a transverse depression marked on either side by a blunt expansion of the lateral margin, probably indicative of a coalesced segment. The first four pairs of legs are slender, directed forward, and densely covered with long, slender hairs on the inferior margins of all the articles. The first pair of legs is shorter than the three following pairs. The last three pairs of legs are ambulatory.

ARCTURUS LONGISPINUS Benedict.

Arcturus longispinus Benedict, Proc. Biol. Soc. Washington, XII, 1898, pp. 44–45.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 854; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 275; American Naturalist, XXXIV, 1900, p. 229.

Locality.—Aleutian Islands.

Depth.—55 fathoms.

Body narrow, elongate, nearly five times longer than wide, 7 mm.: 35 mm.

Head wider than long, 7 mm. : 4 mm., with the anterior margin deeply excavate between the produced antero-lateral angles. The eyes are small, round, composite, and situated at the sides of the head halfway between the antero-lateral angles and the posterior margin. There are two extremely long spines, 7 mm. in length, situated about the middle of the head between the eyes, one on either side of the median line. The first pair of antennæ have the basal article long and somewhat dilated, about twice as long as wide; the second and third articles are subequal in length, each being half as wide as the basal article and much shorter; the fourth article is about one and a half times longer than the third. The first antennæ extend to the end of the second article of the peduncle of the second antennæ. The basal article of the second antennæ is short; the second article is 3 mm. long; the third is four times as long as the second, or 12 mm. long; the fourth is 17 mm. in length; the fifth is 15 mm. The flagellum is composed of eight articles, th

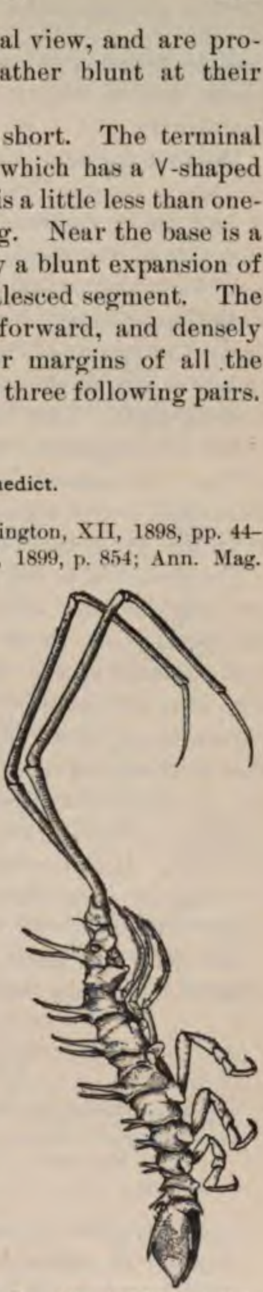

Fig. 360.—Arcturus longispinus (after Benedict). × 1¼.

first being many times longer than the second. The second antennæ are 53 mm. in length. The palp of the maxillipeds is composed of five articles.

The first segment of the thorax has two small tubercles or rudiments of spines, one on either side of the median line. The spines of the second, third, and fourth segments are 6 mm. in length, placed one on each side of the median line. The spines of the fifth segment are 2½ mm. long, one on either side of the median line. The spines of the sixth segment are 2 mm. long, placed one on either side of the median line. The spines of the seventh segment are 1½ mm. long, situated one on either side of the median line. Epimera are distinct on all but the first segment. They increase in size from those of the second to those of the fifth segment, which are the largest, and then decrease in size; all have the lateral margins rounded. The epimera of the second, third, and fourth segments are concealed in a dorsal view by the large knob-like projections on the lateral margins of the segments.

The abdomen is composed of three segments, the first two of which are short and are armed each with two spines, one on either side of the median line, those of the first segment being rudiments as in the first segment of the thorax, while those of the second segment are 2 mm. long and project backward. The first segment has a triangular expansion on either side of the lateral margin. The second has none. The terminal segment has two backward projecting spines situated on the dorsal surface, one on either side of the median line about the middle of the segment. This segment is very much compressed laterally. It terminates in two short points. The lateral margin has a triangular expansion on either side at the base and a smaller one on either side just below the middle of the segment.

The first four pairs of legs are directed forward and are strongly ciliated. The last three pairs are ambulatory.

ARCTURUS GLABER Benedict.

Arcturus glabrus BENEDICT, Proc. Biol. Soc. Wash., XII, 1898, p. 46.
Arcturus glaber RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 855; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 277; American Naturalist, XXXIV, 1900, p. 230.

Locality.—Bering Sea.

Depth.—55 fathoms.

Body narrow, elongate, a little over six times as long as broad, 5 mm.: 31 mm. Head wider than long, 3 mm.: 4 mm. The head measures 4 mm. in length from the antero-lateral angles to the posterior margin. The front is deeply excavate between the produced lateral angles. The eyes are small, transversely ovate, composite, and situated at the sides of the head, halfway between the antero-lateral angles and the posterior margin. The first pair of antennæ have the basal article large and dilated; the second and third articles are subequal and are shorter and smaller than the first; the fourth article is twice as long as either of the two preceding articles. The first antennæ extend to the end of the second article of the peduncle of the second pair of antennæ. The first article of the second antennæ is short, not longer than the basal article of the first pair of antennæ; the second article extends to the end of the first antennæ; the third article is three and a half times longer than the second; the fourth is nearly twice as long as the third; the fifth article is nearly as long as the fourth; the flagellum is composed of six articles, the first one of which is about three times longer than the second or following articles. The second antennæ are longer than the body. The palp of the maxillipeds is composed of five articles.

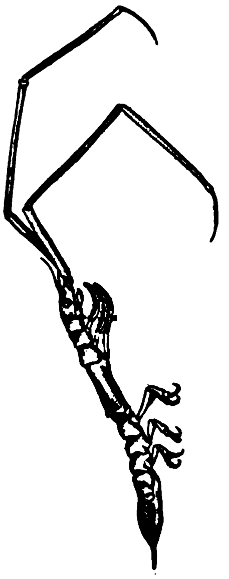
Fig. 361.—Arcturus glaber (After Benedict). × 1½.

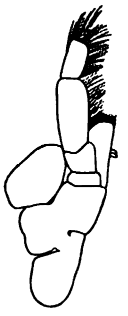
Fig. 362.—Arcturus glaber. Maxilliped. × 11½.

The first three segments of the thorax are subequal, each being 2 mm. in length. The fourth segment is twice as long as either of the three preceding segments and is 4 mm. in length. The fifth segment is 2½ mm. long. The sixth and seventh segments are each 2 mm. in length. Epimera are not represented on the first thoracic segment. The epimera of the three following segments are small and occupy the antero-lateral angles. In the last three segments the epimera are large and laterally produced.

The first two segments of the abdomen are short and subequal. The third or terminal segment is long and tapers to a blunt extremity.

The first four pairs of legs extend forward and are strongly ciliated. The last three pairs are ambulatory.

ARCTURUS PURPUREUS Beddard.

Arcturus purpureus Beddard, Proc. Zool. Soc. London, 1886, p. 109; Report on the Scientific Results of the Exploring Voyage of H. M. S. *Challenger*, Zool., XVII, 1886, pp. 112-113.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 546.

Locality.—Off Sombrero Island.

Depth.—450 fathoms.

"A single specimen of this species was dredged in the North Atlantic at station 23 from a depth of 450 fathoms.

"I have named it *purpureus* on account of the purplish color which appears to characterize the species and is very distinct in the spirit-preserved specimen.

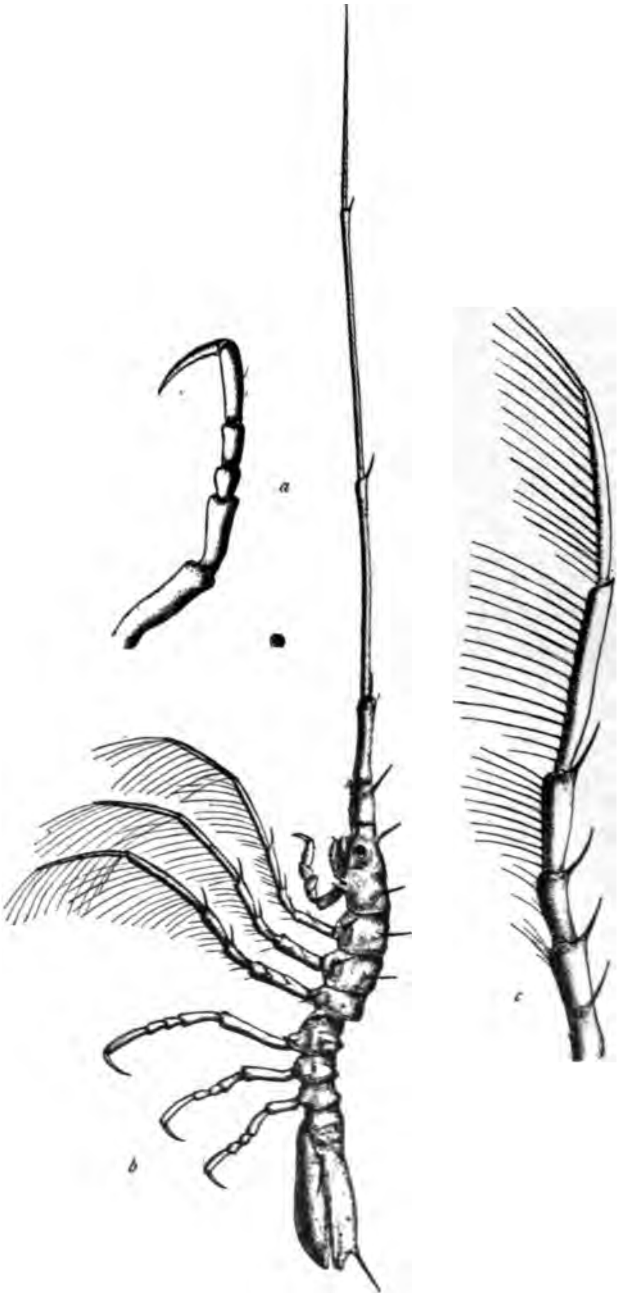

FIG. 363.—ARCTURUS PURPUREUS (AFTER BEDDARD). *a*, ONE OF POSTERIOR THORACIC LEGS. *b*, LATERAL VIEW. *c*, ONE OF ANTERIOR THORACIC LEGS.

"It is closely allied to *Arcturus anna* and to *Arcturus cornutus*, but differs sufficiently from both to constitute the type of a new species.

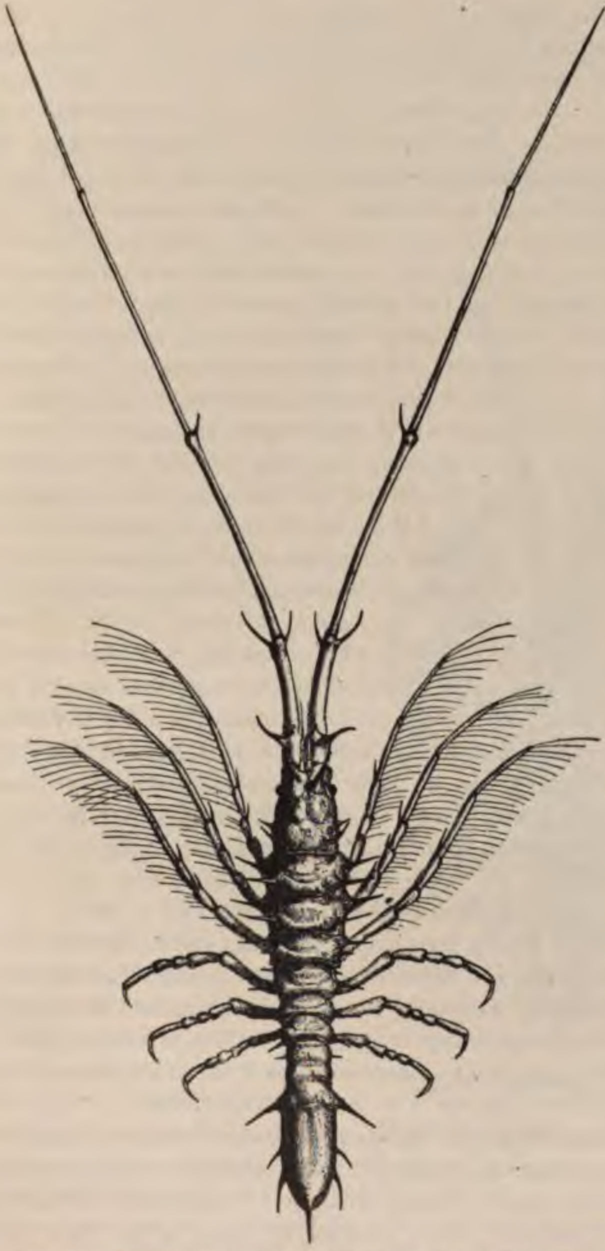

FIG. 364.—ARCTURUS PURPUREUS (AFTER BEDDARD). DORSAL VIEW.

"The extreme length of the specimen, which is a female, is 18 mm., the length of the antennæ 31 mm.

"On the head between the eyes are a pair of long, forwardly curved spines; the hinder portion of the head is occupied by a rounded median convexity; at the antero-lateral margin of the head is a very short, forwardly directed spine, beneath which the margin is excavated by a semicircular notch.

"Of the first four thoracic segments the fourth is rather the shortest. Each of the segments bears an outwardly directed spine on each side of the body, corresponding to the pair on the head and of about equal length; those on the fourth segment, although broken, appeared to have been originally somewhat shorter; close to the lateral margin of each segment, near to its junction with the epimeron, is another long spine projecting outward and over the epimeron. The first segment differs from the succeeding ones in having no separate epimeron, and its lateral margin has two spines instead of one, of which the anterior is the longer; they are both directed forward as well as outward. The fourth thoracic segment has also a second spine, and its postero-lateral margin inclined downward and backward as well as outward.

"Of the three posterior thoracic segments the first is the largest, the two posterior being equal in size; the epimera of all three segments bears a spine directed outward and at right angles to the longitudinal axis of the body; that of the first of the three segments is considerably the longest; this segment bears also a pair of spines upon the tergum continuous with those on the segments in front, and exactly overlying that on the epimeron.

"The first three segments of the abdomen are separated by distinct sutures; the first and the third of the segments have a pair of long lateral spines; those of the third segment mark the boundary between it and the caudal shield; the first abdominal segment has a pair of short ventral spines placed on either side of the median ventral line, and upon a ridge which forms the posterior margin of the segment; anteriorly the segment is bounded by a similar ridge, but without any distinct spines.

"The caudal shield is oval and convex, with a faintly marked longitudinal carina which terminates in a long spine; the lateral margins of the caudal shield are flattened and form a ridge like the brim of a hat; on either side are two long curved spines situated at equidistant intervals, and corresponding in position to the lateral spines on the last abdominal segment; the lateral ridge does not terminate in a flattened spine on either side, as in so many other species.

"The appendages in many cases bear long spines like those upon the body; the antennæ, which are very long, have a pair of spines upon the distal extremity of each of the joints; the anterior thoracic appendages are furnished with a number of stout spines upon the proximal joints; the posterior thoracic appendages are smooth and devoid of any such spines.

"The uropoda are covered with numerous minute granulations but bear no spines."—BEDDARD.[a]

ARCTURUS CARIBBÆUS Richardson.

Arcturus caribbæus RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 546–547.

Locality.—Near Aves Island, Caribbean Sea.

Depth.—683 fathoms.

Head with a deep excavation on the anterior margin, on either side of which the antero-lateral margins are produced, each bearing a short spine at the outer angle. Two long spines are situated on the anterior portion of the head, between the eyes. The first pair of antennæ, consisting of four joints, reach two-thirds of the length of the third joint of the second pair of antennæ. The first joint of the second pair of antennæ is short and unarmed; the second joint is armed with a small spine at the base on the outer margin, and a large spine on the upper lateral margin; the third joint is about three times as long as the second joint, and is armed with two long spines at the upper end; the fourth joint is about twice as long as the third joint, and is armed with a single spine at the upper end; the fifth joint is somewhat longer than the fourth and is unarmed; the flagellum is long and consists of ten joints.

The first, second, third, and fifth thoracic segments have each two long projecting spines, one on either side of the median dorsal line. The fourth, sixth, and seventh segments are without these spines. The first segment has three spines, one large central spine and two small spines on each antero-lateral margin. All the other thoracic segments have one long spine on each lateral margin.

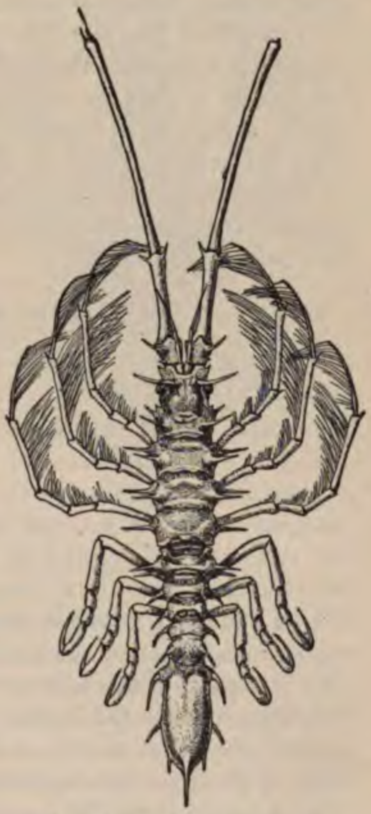

FIG. 365.—ARCTURUS CARIBBÆUS.

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[a] Challenger Report, XVII, 1886, pp. 112–113.

The first abdominal segment has one lateral spine on each side; the second segment has two dorsal spines, one on either side of the median line. The terminal segment has one lateral spine on each side near the base. It is rounded in outline posteriorly, with two lateral spines on either side, one a little below the middle and one near the posterior margin of the segment. There is also a large terminal spine on the dorsal surface.

The opercular valves are armed each with a single spine about the center of the valve. The penultimate joint of the second, third, and fourth anterior pairs of legs is armed with a single spine.

One specimen of this species was taken by the U. S. Bureau of Fisheries steamer *Albatross* near Aves Island, Caribbean Sea.

Type.—Cat. No. 9113, U.S.N.M. This species closely resembles *Arcturus purpureus* Beddard, differing from that species in having two dorsal spines on the second abdominal segment, spines on the opercular valves and at the base on the outer margin of the second joint of the peduncle of the second pair of antennæ, in wanting spines on the proximal joints of the anterior thoracic appendages, with the exception of the penultimate joint, and in the greater length of the first pair of antennæ.

ARCTURUS FLORIDANUS Richardson.

Arcturus floridanus RICHARDSON, American Naturalist, XXXIV, 1900, p. 230; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 548–549.

Locality.—Fernandina, Florida.

Depth.—273 fathoms; 270 fathoms.

Head with deep anterior excavation, on each side of which the lateral margins are produced, bearing each a single spine at the outer angle. On the anterior portion of the head are two long spines situated between the eyes. Two long spines are placed on the posterior portion of the head, between the line of the eyes, on either side of which are two small spines, one near each eye and one on the lateral margin. The first pair of antennæ are short, reaching only half the length of the third joint of the second pair of antennæ. The first joint of the second pair of antennæ is short and unarmed; the second joint has one short spine at the base and three long ones at the upper end; the third joint is nearly three times as long as the second joint, and has two long spines at the upper end; the fourth joint is armed with a single spine; the fifth joint is unarmed; the flagellum is nine-jointed.

The first thoracic segment has two dorsal spines on the anterior part, one on either side of the median line, six spines on the posterior part, three on either side of the median line, and two lateral spines; the second thoracic segment has three spines on the anterior portion, one in the median line and one on either side of it, four spines on the posterior portion, two on either side of the median line, and three lateral spines; the third thoracic segment has two spines on the anterior portion, one on either side of the median line, four spines on the posterior portion, two on either side of the median line, and four lateral spines; the fourth segment has two spines on the anterior part, one on either side of the median line, four spines on the posterior part, two on either side of the median line, and four lateral spines; the fifth segment has two spines widely separated, one on either side of the median line, and one lateral spine; the sixth and seventh segments have six spines, three on either side of the median line, and one lateral spine.

The first two abdominal segments have each eight small spines, four on either side of the median line. The terminal segment has one median row of spines and a row on either side of this and a lateral row. The median row consists of five small spines and one large terminal spine. The dorsal row on either side of the median row each consists of four spines. The outer marginal lateral rows each consists of three spines, a pair at the base, a pair about the middle, and a pair at the extremity. At the base of the segment is a transverse row of four small spines. The opercular valves have each a longitudinal row of eight spines.

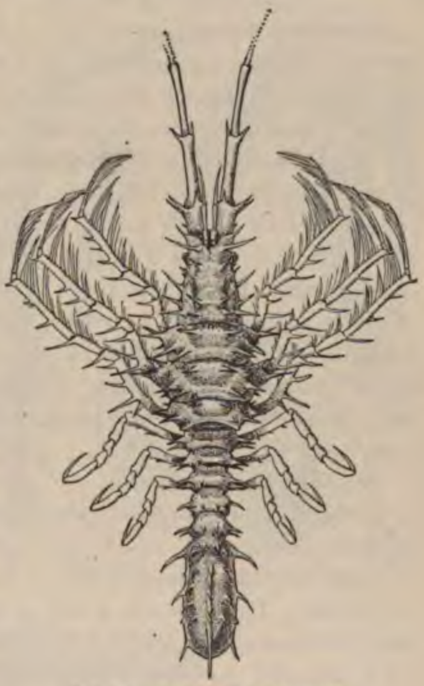

FIG. 366.—ARCTURUS FLORIDANUS.

Both the anterior and the posterior pairs of legs are covered with spines, the anterior ones more densely.

Two specimens, one imperfect, were obtained by the U. S. Bureau of Fisheries steamer *Albatross* at Fernandina, Florida.

Type.—Cat. No. 11522, U.S.N.M.

ARCTURUS BAFFINI (Sabine).

Idotea baffini SABINE, Suppl. to App. to Capt. Parry's Voyage, 1824, p. 228, pl. I, figs. 4–6.

Arcturus tuberculatus LATREILLE in Cuvier, Règne Animal, 2d ed., IV, 1829, p. 139.

Arcturus baffini WESTWOOD, Trans. Entom. Soc., London, I, 1836, p. 72.—MILNE EDWARDS, Hist. Nat. Crust., III, 1840, p. 123, pl. XXXI, fig. 1.—G. O. SARS, Den Norske Nordhavs Expedition, Zool., Crust., I, 1885, p. 97, pl. IX, figs 1–21.—Beddard, Report on the Scientific Results of the Exploring Voyage of H. M. S. Challenger, Zool., XVII, 1886, pl. XX, fig. 12.—Hansen, Vid Medd. naturh. Foren. i Kjøbh., 1887–88, pp. 188–189.—Axel Ohlin, Akademisk Afhandling, XXII, 1895, pp. 15–18.—Benedict, Proc. Biol. Soc Washington, XII, 1898, p. 43.—Richardson, American Naturalist, XXXIV 1900, p. 230; Proc. U. S. Nat. Mus., XXIII, 1901, p. 549.—Ortmann, Proc Phila. Acad. Nat. Sci., 1901, pp. 156–157.—Norman, Ann. Mag. Nat. Hist (7), XIV, 1904, pp. 444–445.

Localities.—Latitude 65° 35′ north, longitude 54° 50′ west; latitude 66° 32′ north, longitude 55° 34′ west; latitude 43° 55′ north, longitude 49° 8′ west; Granville Bay; Cape Alexander; Elsmere Land and Greenland; Union Bay, Beechy Island; latitude 67° 59′ north, longitude 56° 33′ west; latitude 68° 9′ north, longitude 56° 32′ west; latitude 70° 29′ north, longitude 55° 40′ west; latitude 71° 10′ north, longitude 58° 56′ west; latitude 78° 24′ north, longitude 74° west; Inglefield Gulf; Murchison Sound; Cape Faraday; latitude 60° 21′ north, longitude 5° 41′ west; Baffin Bay; near Cape York; Grinnell Land; Franklin Pierce Bay, or latitude 79° 29′ north; Cape Napoleon, or latitude 79° 38′ north; Dobbin Bay, or latitude 79° 40′ north; Floeberg Beech, or latitude 82° 27′ north; Barden Bay; Olriks Bay; Robertson Bay; Faroe Channel; latitude 72° 38′ north, longitude 77° 10′ west; latitude 72° 8′ north, longitude 74° 20′ west.

Depth.—5–150 fathoms.

Body narrow, elongate, nearly seven times longer than wide, 6 mm.: 40 mm.

Head as wide as long, 5 mm.: 5 mm., with the anterior margin deeply excavate. The eyes are small, composite, about twice as wide as long, and situated at the sides of the head, about halfway between the anterior and the posterior margins. There are two large spines on the posterior half of the head, one on either side of the median line. The basal article of the first pair of antennæ is long and somewhat dilated; it is as long as the two following articles, which are subequal, taken together; the fourth article is about one and a half times longer than the first article. The first pair of antennæ extend to the end of the second article of the peduncle of the second pair of antennæ. The second pair of antennæ have the basal article short and not reaching beyond the antero-lateral angles of the head on the dorsal side; the second article extends to the end of the first pair of antennæ; the third article is about three times as long as the second article; the fourth is one and a half times longer than the third; the fifth is as long as the fourth. The flagellum is composed of ten articles, the last article terminating in a spine. The second antennæ are longer than the body, being 50 mm. in length. The maxillipeds have a palp of five articles. The palp of the mandibles is absent.

The first three segments of the thorax are equal in length; the fourth is twice as long as either one of the preceding segments; the fifth is also half as long as the fourth; the sixth and seventh are slightly shorter than the fifth. There are two long spines on each one of the thoracic segments, one on each side of the median longitudinal line. The lateral parts of the first segments are broadly expanded and surround the posterior portion of the head at the sides. The epimera of the second, third, and fourth segments are small, but distinctly separated from the segments; they occupy the antero-lateral angles of the segments and are not visible in a dorsal view. The epimera of the last three segments are large and also distinctly separated; they project at the sides of the segments, being produced in long, acute processes, and are conspicuous from a dorsal view.

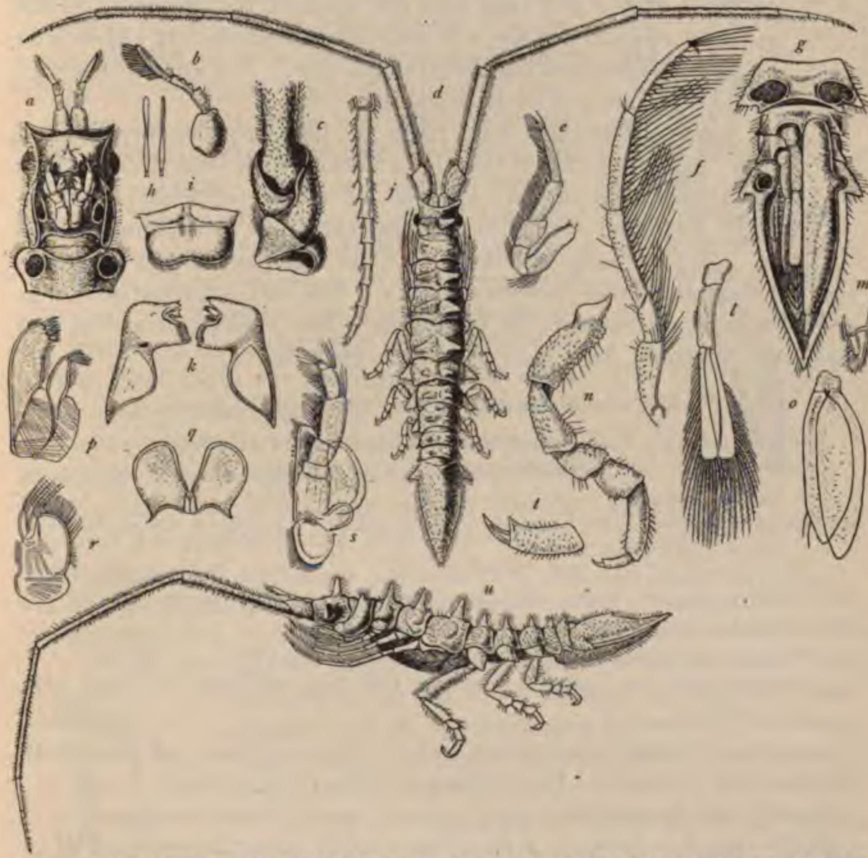

FIG. 367.—ARCTURUS BAFFINI (AFTER G. O. SARS). *a*, ANTERIOR PART OF BODY, WITH FIRST PAIR OF ANTENNA AND ORAL APPENDAGES VIEWED FROM BELOW. *b*, FIRST ANTENNA. *c*, BASE OF SECOND ANTENNA. *d*, ADULT FEMALE, FROM ABOVE. *e*, FIRST LEG. *f*, SECOND LEG. *g*, POSTERIOR PART OF BODY, VIEWED FROM BELOW (ONE OF OPERCULAR VALVES REMOVED). *h*, TWO SENSORY APPENDICES OF FIRST ANTENNA. *i*, LABRUM. *j*, FLAGELLUM OF SECOND ANTENNA. *k*, MANDIBLES. *l*, ONE OF ANTERIOR PLEOPODS. *m*, TERMINAL BRANCHES OF OPERCULAR VALVE (INNER SIDE). *n*, SEVENTH LEG. *o*, ONE OF POSTERIOR PLEOPODS. *p*, FIRST MAXILLA. *q*, LABIUM. *r*, SECOND MAXILLA. *s*, MAXILLIPED. *t*, TERMINAL CLAW OF SEVENTH LEG. *u*, LATERAL VIEW.

The first two segments of the abdomen are short, and each is provided with two dorsal spines, one on either side of the median longitudinal line. The first segment also has the sides produced in acute processes, one on either side, not separated from the segment and simulating the epimera of the last three thoracic segments. The last or terminal segment is very long, 11 mm., about one-fourth the entire length of the body. At the base on either side, the lateral margin is produced in a long, acute process. Halfway between the base and the apex of the segment, on the dorsal surface, are two tubercles, one on either side of the median longitudinal line. The apex of the segment is acutely pointed.

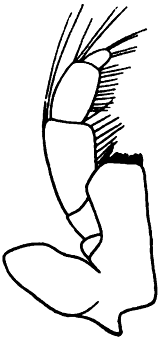
FIG. 368.—ARCTURUS BAFFINI. MAXILLIPED. × 15½.

The first four pairs of legs are slender, directed forward, and thickly furnished with long slender hairs on the inferior margins of all the articles. The terminal article is minute; the three preceding articles are long and slender. The first pair of legs are much shorter than the three following pairs. The last three pairs of legs are stout and ambulatory in character. The entire surface of the body, the antennæ, legs, etc., is densely granular.

ARCTURUS BAFFINI var. TUBEROSUS Sars.

Arcturus tuberosus SARS, Archiv Math. og Naturvid., 1877, p. 350.

Arcturus baffini var. *feildeni* MIERS, Ann. Mag. Nat. Hist. (4), XIX, 1877, p. 64, pl. III, fig. 1.

Arcturus tuberosus SARS, Norwegian North Atlantic Expedition, Crustacea, 1885, p. 102, pl. IX, fig. 22.

Arcturus feildeni BENEDICT, Proc. Biol. Soc. Washington, XII, 1898, p. 44.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 230; Proc. U. S. Nat. Mus., XXIII, 1901, p. 549.

Arcturus baffini ORTMANN, Proc. Acad. Nat. Sci. Phila., 1901, pp. 156–157.

Arcturus baffini var. *tuberosus* NORMAN,[a] Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 445.

Localities.—Camp Clay, Cape Sabine; Davis Straits; off Churchill, Hudson Bay; Granville Bay; Elsmere Land or Greenland.

Depth.—20–30 fathoms—clay bottom; small stones and gravel.

Body narrow, elongate, a little over eight times longer than wide, 4 mm.: 35 mm., not including the antennæ.

The head is as wide as long, 4 mm.: 4 mm., with the anterior margin deeply excavate. The eyes are small, wider than long, composite, and situated at the sides of the head about halfway between the anterior and the posterior margins. The first pair of antennæ have the basal article long and somewhat dilated; the second and third articles are subequal, and the two together are equal in length to the basal article; the fourth article is one and a half times longer than the first article. The first antennæ extend to the end of the second article of the peduncle of the second antennæ. The basal article of the second antennæ is short, and, on the dorsal side, does not extend beyond the antero-lateral angles of the head; the second article extends to the end of the first pair of antennæ; the third article is nearly three times as long as the second; the fourth and fifth are subequal, and each is one and a half times longer than the third. The flagellum is composed of ten articles, the last article terminating in a short spine. The second antennæ are a little longer than the body, being 37 mm. in length. The maxilliped has a palp of five articles. The palp of the mandibles is wanting.

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[a] Norman proposes a third variety, *A. baffini* var. *intermedia*, in which the tubercles on the first four segments of the thorax and the elevation on the head are greatly reduced in size, but on the fifth and succeeding segments they are as well represented as in the typical form.

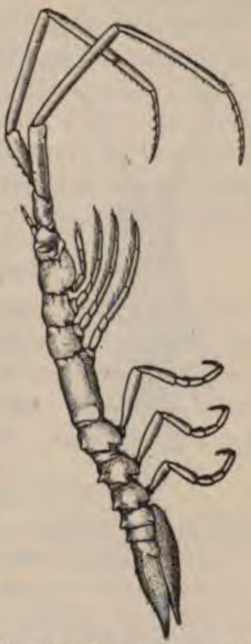
FIG. 369.—ARCTURUS BAFFINI VAR. TUBEROSUS (AFTER BENEDICT). × 1¼.

The first three segments of the thorax are subequal; the fourth is twice as long as any of the preceding ones; the fifth is about half as long as the fourth; the sixth and seventh are a little shorter than the fifth. The last three segments are each furnished with two low tubercles, one on either side of the median longitudinal line. The lateral parts of the first segment are expanded and surround the posterior portion of the head. The epimera on the second, third, and fourth segments are small, narrow plates, distinctly separated from the segments and placed on the antero-lateral angles; they are not visible in a dorsal view. The epimera of the last three segments are distinctly separated from the segments and are visible in a dorsal view; they are large, broad plates with the exterior angles bluntly rounded.

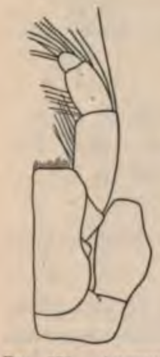
FIG. 370.—ARCTURUS BAFFINI VAR. TUBEROSUS. MAXILLIPED. × 15¼.

The first two segments of the abdomen are short, and each is provided with two low tubercles, one on either side of the median longitudinal line. The terminal segment is long, and produced to an extremity which is somewhat acute. About the middle of the segment, on the dorsal surface, are two low longitudinal ridges, one on either side of the median line. There is also at the base of the segment a blunt projection, almost inconspicuous, on either side of the lateral margin.

The first four pairs of legs are slender, directed forward, and densely covered with long, slender hairs on the inferior margins of all the articles. The first pair are much shorter than the three following pairs. The last article in all four pairs is very minute; the three preceding articles are long and narrow. The last three pairs of legs are ambulatory.

Ortmann[a] says of this form: "Very young individuals are always without spines, and thus young individuals always belong to the var. *feildeni* (*tuberosus*), although their mother, to whose antennæ they cling, may be a true *baffini*. In larger individuals the spines are developed in a different degree, and there are all intermediate stages between the strongly spinous *A. baffini* and the almost smooth *A. feildeni* (*tuberosus*)."

86. Genus PLEUROPRION zur Strassen.[b]

Body with the fourth segment of the thorax not greatly longer than the others. Marsupium as in the genus *Arcturus*. Abdomen composed of only two segments, one segment anterior to the large terminal segment. The head is united a least dorsally with the first thoracic segment. The epimera are not distinct.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS PLEUROPRION.

a. Head with three spines on the anterior part in front of the eyes. Third article of the peduncle of the second antennæ not longer than the second article and armed with two spines. Four spines present on posterior portion of head. Two spines present, one on either side of the median line just below the constriction in the fourth thoracic segment. Two longitudinal rows of spines, one on either side of the median line on the terminal abdominal segment. One spine present on basal joint of legs............*Pleuroprion murdochi* (Benedict)

a′. Head with a single spine on the anterior part. Third article of peduncle of second antennæ twice as long as the second article and unarmed. Two spines present on posterior portion of head. Spines absent just below the constriction in the fourth thoracic segment. Longitudinal rows of spines on last abdominal segment absent. Two spines present on coxal joint of legs.
Pleuroprion intermedium (Richardson)

PLEUROPRION MURDOCHI (Benedict).

Arcturus murdochi Benedict, Proc. Biol. Soc. Washington, XII, 1898, pp. 49–50.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 855; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 277; American Naturalist, XXXIV, 1900, p. 230.

Locality.—Point Franklin, Alaska.

Body narrow, elongate, a little more than three times longer than wide, 3½ mm.: 12 mm.

Head wider than long, 1½ mm.: 3 mm., with the front deeply excavate between the lateral angles. The eyes are small, round, composite, and situated at the sides of the head halfway between the antero-lateral angles and the posterior margin. Just back of the anterior margin of the head are three spines in a transverse row, one median and one on either side of the median spine, all three lying between the eyes. The median spine is a little anterior to the other two. On the posterior portion of the head are eight spines in a transverse row, four on either side of the median line. Four of these spines lie between the eyes, one behind each eye, and one lateral to each eye. There is also a spine on each of the antero-lateral projections. The first pair of antennæ have the basal article large and dilated; the second article is almost as long as the first, but much more slender; the third is half as long as the second; the fourth is twice as long as the third. The first pair of antennæ extend to the end of the second article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short, and does not extend beyond the basal article of the first pair of antennæ; the second article is armed with three spines, and extends to the end of the first pair of antennæ; the third article is one and a half times longer than the second, and is armed with two spines; the fourth is two and a half times longer than the third, and is unarmed; the fifth is twice as long as the third, and is unarmed. The flagellum is composed of three articles, the first of which is twice as long as the second; the terminal one is one-third as long as the second. The maxillipeds have a palp of five articles.

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[a] Proc. Acad. Nat. Sciences, Phila., 1901, pp. 156–157.

[b] Zool. Anzeiger, XXV, 1902, pp. 682–689; XXVI, 1903, p. 31.

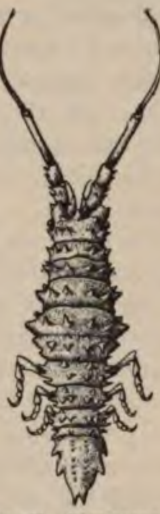

FIG. 371.—PLEUROPRION MURDOCHI (AFTER BENEDICT). × 3½.

The first segment of the thorax has eight spines in a transverse row, four on either side of the median line. The second segment has six spines in a transverse row, three on either side of the median line. The third segment has eight spines in a trans-verse row, four on either side of the median line, and an additional spine on either side anterior to the most lateral one. The fourth segment has two transverse rows of spines, with a constriction between the two rows. The first row has ten spines in a transverse series, five on either side of the median line, with three additional smaller spines, one anterior and one posterior to the most lateral spine, and one anterior to the spine next to the most lateral one; the second row has six spines in a transverse series, three on either side of the median line, with an additional smaller spine posterior to and between the two most lateral spines; there are also two spines anterior to the two median spines and back of the constriction, one on either side of the

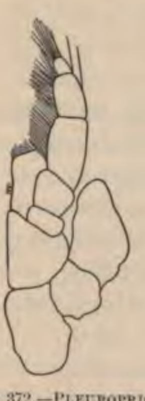

FIG. 372.—PLEUROPRION MURDOCHI. MAXILLIPED. × 27½.

median line. The fifth segment has eighteen spines, nine on either side of the median line; they are arranged one on either side of the median line, two in longitudinal series lateral to these, and two other longitudinal series of three each, lateral to the others. The sixth segment has a transverse row of eight spines, four on either side of the median line, with a smaller spine anterior to each one of the larger spines with the exception of the two median ones. The seventh segment has eight spines in a transverse row, four on either side of the median line, with a smaller spine on either side anterior to the most lateral one.

The abdomen is composed of two segments. The first segment has two longitudinal rows of three spines in each row, one on either side of the median line. Lateral to these are two spines on either side in transverse series. The terminal segment has two longitudinal rows of four spines in each row, one on either side of the median line; lateral to each row is another small spine; the lateral margins of the segment are produced on either side in two downward-projecting spines; it terminates posteriorly in two long spines, one on either side of the median line; at the base of the segment, between the longitudinal row and the first laterally projecting spine is a smaller spine, one on either side.

The basis of all the legs is furnished with a small spine.

PLEUROPRION INTERMEDIUM (Richardson).

Arcturus intermedius RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 854–855; Ann. Mag. Nat. Hist., (7), IV, 1899, pp. 275–277; American Naturalist, XXXIV, 1900, p. 230.

Locality.—Kyska Harbor, Aleutian Islands.

Depth.—10 fathoms.

Head with a deep excavation on its anterior margin, the antero-lateral angles being produced in a double process, the inner one rounded, the outer one acutely pointed. Near the anterior margin in the median line is one large spine. Just back of the eyes and between them are two long spines. The lateral margins of the head are produced in two small angulations with a rounded sinus between, posterior to the double antero-lateral process. On the post-lateral margin on either side of the head is a small spine.

The first pair of antennæ are small and short, not reaching to the end of the second joint of the second pair of antennæ. The first joint of the second pair of antennæ is visible and unarmed; the second joint is armed with three spines; the third joint is unarmed, and is about twice as long as the second joint; the fourth and fifth joints are about equal in length and each is about twice as long as the third; the flagellum consists of three joints.

The first, second, and third thoracic segments have a transverse row of six large spines, three on either side of the median longitudinal line, the two center ones being the longest, although all are very long. The fourth segment is twice as long as any of the other segments, and has a transverse constriction on the posterior half of the segment. On the anterior portion are six spines, three on either side of the median line, the four outer ones being in a straight line, the inner two below this line. On the posterior portion are six spines also, three on either side of the median line. The fifth thoracic segment has twelve spines, six on either side of the median line. The sixth segment has ten spines, five on either side. The seventh and last segment has eight spines, four on either side.

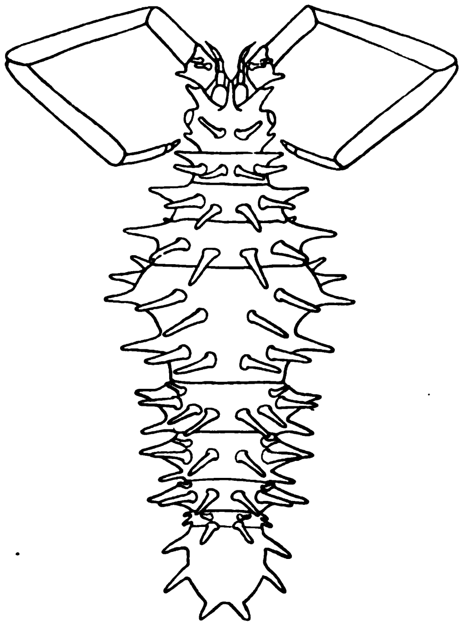

FIG. 373.—PLEUROPRION INTERMEDIUM. × 10.

The abdomen is composed of two segments. The first is short, with twelve spines, six on either side of the median line, the four inner ones being arranged in two longitudinal series, the two upper ones being small, the two lower ones very long. The terminal segment has the upper surface smooth. This segment terminates in two long divergent spines. There is a single spine on the lateral margin on either side about the middle of the segment, and another near the base of the segment. The three anterior pairs of legs have each two spines on the coxal joint and one spine on the basis. The body increases in width from the first to the fourth segment, and then decreases in width from the fourth to the terminal segment.

One specimen from Kyska Harbor, Aleutian Islands, 10 fathoms, collected by Dr. W. H. Dall.

Type.—Cat. No. 22581, U.S.N.M.

This species differs from *P. murdochi* in the absence of spines on the third joint of the second pair of antennæ; in the greater length of this joint in relation to the preceding joint; in the greater length of the two following joints; in the presence of a single spine on the anterior part of the head, while in *P. murdochi* there are three, and of two spines on the posterior part, while in *P. murdochi* there are four; in the absence of two small spines just below the constriction in the fourth segment; in the absence of the row of spines on the terminal segment of th body; and in the presence of two spines on the coxal joint and one o the basal joint of the legs, while in *P. murdochi* there is but one spine on the basal joint.

This species is also distinguished from *P. hystrix*[a] in the presence of a single median spine on the anterior part of the head, while in *P. hystrix* there are two, one on either side of the median line and widely separated; in the presence of two spines on the posterior part of the head, while in *P. hystrix* there are four; in the absence of the double row of spines on the terminal segment of the body; and in the absence of the spine at the articulation of the third joint of the second pair of antennæ.

Family XIV. IDOTHEIDÆ.[b]

Body more or less broad, depressed. First pair of antennæ with the flagellum uniarticulate. Second pair of antennæ with the flagellum uniarticulate or multi-articulate. Mandibles without palps.

Segments of thorax of uniform length and appearance. Epimera sometimes distinct and sometimes coalesced with the segments.

Abdomen with some or all of the segments fused to form the large terminal segment.

Legs usually nearly alike and ambulatory, but sometimes the three anterior pairs are pronouncedly subcheliform in structure.

Incubatory pouch normal.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY IDOTHEIDÆ.

a. Sides of head emarginate or cleft and laterally produced beyond the eyes, which are dorsally situated. First three pairs of legs with the sixth article or propodus dilated and forming, with the reflexible dactylus, a subchelate hand.
  b. Palp of maxillipeds composed of five articles. Inner branch of uropoda minute. Species large....................................Genus *Mesidotea*, new genus
  b'. Palp of maxillipeds composed of three articles. Inner branch of uropoda half as long as outer branch. Species small.............Genus *Chiridotea* Harger
a'. Sides of head in a dorsal view entire and not laterally produced. Eyes lateral. Legs all nearly alike, with the sixth article or propodus not expanded or but little expanded; seventh article prehensile.
  b. Flagellum of second pair of antennæ well developed and multi-articulate.
    c. Abdomen (including the terminal segment) consisting of three segments with lateral sutures of another partly coalesced segment. Epimera of all the segments, from the second to the seventh, inclusive, well developed and distinct from the segments.
      d. Palp of maxillipeds with four articles..............Genus *Idothea* Fabricius
      d'. Palp of maxillipeds with five articles........Genus *Pentidotea*, new genus
    c'. Abdomen consisting of one segment, with lateral sutures of another partly coalesced segment.
      d. Palp of maxillipeds with three articles. All the epimera coalesced and perfectly united with the segments............Genus *Synidotea* Harger

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[a] *Ilyarachna hystrix* Sars.

[b] See Sars for characters of family, Crust. of Norway, II, 1899, pp. 78–79.

d'. Palp of maxillipeds with four articles. Epimera of second, third, and fourth segments coalesced and perfectly united with the segments; those of the fifth, sixth, and seventh segments distinct and well developed.
Genus *Colidotea* Richardson

b'. Flagellum of second pair of antennæ not multi-articulate.

c. Second pair of antennæ shorter than the first pair. Flagellum rudimentary Epimera of all the segments united with the segments. Abdomen composed of a single segment, with lateral incisions near the base. Maxillipeds with a palp of three articles................Genus *Edotea* Guérin-Méneville

c'. Second pair of antennæ much longer than the first pair. Palp of maxillipeds usually composed of four articles.

d. Abdomen consisting of a single segment. Flagellum of second antennæ consolidated to form a single clavate article.

e. Epimera of all the segments united with the segments except the last two, which are well developed and distinct. Lateral sutures at base of abdomen indicate another partly coalesced segment.
Genus *Eusymmerus* Richardson

e'. Epimera distinct on all the segments of the thorax, including the first. No lateral sutures at base of abdomen....Genus *Erichsonella* Benedict

d'. Abdomen consisting of more than one segment. Flagellum of second pair of antennæ consolidated to form a single article or composed of only two or three articles.................................Genus *Cleantis* Dana

57. Genus MESIDOTEA, new genus.[a]

Palp of maxillipeds composed of five articles. Sides of head cleft. Eyes dorsally situated. Second pair of antennæ with a multi-articulate flagellum. Epimera of all the segments of the thorax, with the exception of the first, distinctly separated from the segments.

Abdomen composed of four segments, with suture lines at the base of the fourth or terminal segment indicating another partly coalesced segment. First three pairs of legs prehensile, with propodus dilated and dactylus reflexed. Last four pairs of legs ambulatory.

Inner branch of uropoda minute.

Species large.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS MESIDOTEA.

a. Articles of the peduncle of the second antennæ not dilated; flagellum composed of from eight to fourteen articles. Antero-lateral cervical lobes prominent. Eyes present.......................................*Mesidotea entomon* (Linnæus)

a'. Articles of the peduncle of the second antennæ greatly dilated; flagellum composed of from seven to eight articles. Antero-lateral cervical lobes not prominent. Eyes absent..............................*Mesidotea sabini* (Krøyer)

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[a] This genus is proposed for the two forms, *entomon* and *sabini*, which have been heretofore referred to the genus *Glyptonotus* Eights, and more recently to the genus *Chiridotea* Harger. The genus *Mesidotea* differs from the genus *Glyptonotus* in having the epimera of all the segments of the thorax, with the exception of the first, distinctly separated from the dorsal portion of the segments. In *Glyptonotus* the epimera are separated on the last three segments only. The new genus differs from both *Chiridotea* Harger and *Glyptonotus* Eights in having the palp of the maxillipeds composed of five articles instead of three.

MESIDOTEA ENTOMON (Linnæus).[a]

Oniscus entomon Linnæus, Syst. Nat., 12th ed., I, Pt. 2, 1767, p. 1060.—Pallas, Spicil. Zool., IX, 1772, p. 64, pl. v, figs. 1-6.

Squilla entomon De Geer, Mém. pour servir à l'Hist. des Insectes, VII, 1778, p. 514, pl. xxxii, figs. 1-10.

Asellus entomon Olivier, Encycl. Méth., IV, 1789, p. 253.

(?) *Cymothoa entomon* Fabricius, Ent. Syst., II, 1798, p. 505.

Idotea entomon Bosc, Hist. Nat. des Crust., II, 1802, p. 178.—Latreille, Hist. Nat. Crust. et Ins., VI, 1803-4, p. 361; VII, pl. lviii, figs. 2-3.—(?) Lamarck, Hist. des Anim. sans Vert., 1st ed., V, 1818, p. 159.—Rathke, Neuste Schriften der naturf. Gesellsch. in Danzig, I, 1820, p. 109, pl. iv.—(?) Desmarest, Consid. Crust., 1825, p. 289.—Krøyer, Vid. Selsk. Skrift., VII, 1838, p. 323.—Milne Edwards, Hist. Nat. Crust., III, 1840, p. 128.—Krøyer, Nat. Tidsskr., II, 1846-49, p. 402.—White, List Cr. Brit. Mus., 1847, p. 93.—Brandt, Crust. in Middendorf's Sibirische Reise, II, 1851, p. 145.

(?) *Saduria entomon* Adams in White, Sutherland's Voy. Baffin's Bay, Appendix, 1852, p. 207.

Idotaga longicauda Lockington, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 45.

Idotea entomon Meinert, Nat. Tidsskr. (3), XI, 1877, p. 84.—Brandt, Comptes Rendus, 1880, p. 713; Ann. Mag. Nat. Hist., VI, 1880, p. 98.

Glyptonotus entomon Miers, Trans. Linn. Soc. London, XVI, 1883, pp. 12-13, pl. i, figs. 1-2. (See Miers for further synonymy.)—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 843; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 262.

Localities.—Circumpolar: west coast of North America to Pacific Grove, California; Stockholm's skärgård (J. Lindahl); Kielerbucht, Germany; Nakvak, Labrador; Kara Sea.

Found on beach; 5-8 fathoms in sand and gravel; 15 fathoms.

Body ovate, broad anteriorly, and tapering to a narrow pointed extremity; about two and a half times longer than broad, 7 mm. : 17 mm. Length of abdomen nearly equal to half the length of entire body, 8 mm. : 17 mm.

Lateral margins of head cleft, with the two lobes about equal in size, the anterior one more rounded in outline, the posterior one more acute; the posterior lobe is not produced at the sides beyond the anterior one. The front of the head is deeply excavate between the antero-lateral lobes, and there is a small median excavation. The eyes are distinct, small and round, compound in structure, dorsally placed at the base of the lateral cleft. The first antennæ have the basal article enlarged, about twice as wide as the second article and very little longer; the third article is one and a half times longer than the second; the fourth article is just a little longer than the third. The first antennæ extend to the middle of the fourth article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is almost inconspicuous; the second, third, and fourth articles are all short, about equal in length, although the second is nearly twice as wide as the two following, being as wide as the basal article; the fifth article is one and a half times longer than any of the three preceding ones. The flagellum is composed of five articles, the first one being nearly three times as long as any of those following. The maxillipeds have a p

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[a] The description is from a small specimen. In the adult the flagellum consists of more joints.

of five articles.

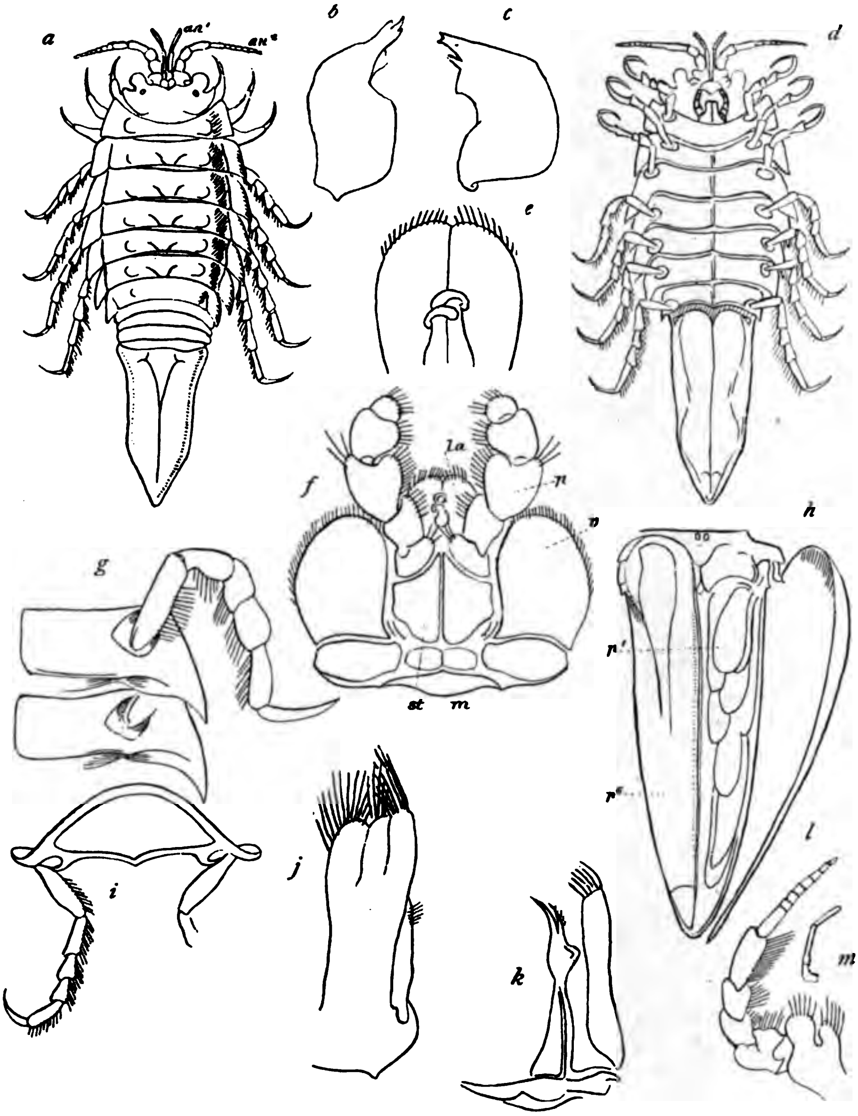


FIG. 374.—MESIDOTEA ENTOMON (AFTER GERSTÆCKER). *a*, DORSAL VIEW. × 1¼. *b*, MANDIBLE. *c*, MANDIBLE. *d*, VENTRAL VIEW. × 1¼. *e*, LABIUM. *f*, MAXILLIPEDS. *g*, HALF OF TWO THORACIC SEGMENTS ABOUT THE MIDDLE, WITH ONE LEG. *h*, ABDOMEN (VENTRAL SIDE). *i*, CROSS SECTION OF A THORACIC SEGMENT ABOUT THE MIDDLE. *j*, SECOND MAXILLA. *k*, FIRST MAXILLA. *l*, SECOND ANTENNA. *m*, FIRST ANTENNA.

The segments of the thorax are subequal, the first and the last being a little shorter than any of the intermediate ones. The epimera are distinct on all the segments, from the second to the seventh, inclusive, and occupy the entire lateral margin. Those of the last five segments are greatly produced posteriorly in extremely long, acutely pointed processes, increasing in length to the sixth segment; the epimeron of the seventh segment is only about half as long as that of the sixth.

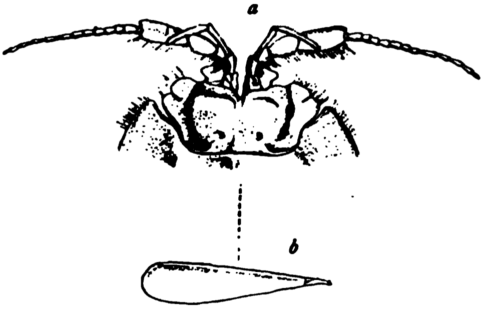


FIG. 375.—MESIDOTEA ENTOMON (AFTER MIERS). *a*, HEAD WITH BOTH ANTENNÆ. × ⅞. *b*, OPERCULAR VALVE (INNER SIDE). × ⅞.

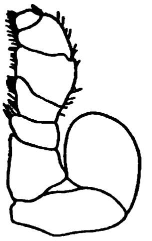


FIG. 376.—MESIDOTEA ENTOMON. MAXILLIPED. × 20½.

The first three pairs of legs are subchelate, with propodus dilated, and dactylus reflexed. The inferior margin of the propodus is armed with long and short spines. The last four pairs of legs are ambulatory.

The abdomen is composed of five segments, four short ones, followed by a long terminal segment, partly coalesced with the last short segment. The sides of the terminal segment converge to a narrow pointed extremity, with indications of lateral angles about two-thirds the distance from the base to the extremity of the segment. The opercular valves are in two parts, a large upper portion and a very small terminal portion. Within the valves on the underside is a small lobe attached to the terminal division and representing the inner branch of the modified uropoda.

MESIDOTEA SABINI (Krøyer.)

Idotea sabini KRØYER, Nat. Tidsskr. (2), II, 1846–49, p. 401.—REINHARDT, Natur. Bidrag til en Beskrivelse af Grönland, 1857, p. 34.—LÜTKEN, List of Crust. of Greenland in Arctic Manual, 1875, p. 149.—SARS, Arch. f. Math. og Naturvidensk., II, 1877, p. 350.

Glyptonotus sabini MIERS, Jour. Linn. Soc. London, XVI, 1883, pp. 15–17, pl. I, figs. 3–5.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjobenhaven, 1887–88, p. 187.—AXEL OHLIN, Akademisk Afhandling, XXII, 1895, pp. 13–14.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 844; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 263.

Chiridotea sabini STEBBING, Ann. Mag. Nat. Hist. (7), V, 1900, p. 14.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 226; Proc. U. S. Nat. Mus., XXIII, 1901, p. 538.

Localities.—Davis Straits; Repulse Bay, North America; Cape Dudley Digges; Cape Faraday; latitude 73° 43′ north, longitude 78° 48′ west; latitude 71° 31′ north, longitude 49° 12′ east; latitude 77° 14′ north, longitude 38° 26′ east; latitude 71° 57′ north, longitude 73° 56′ west; latitude 71° 42′ north, longitude 73° west; latitude 66° 33′ north, longitude 61° 50′ west; Julianehaab and Ivsugigsok, Greenland; Cape Smyth, Alaska; Point Barrow, Alaska; Ooglaamie, Alaska; Kara Sea; circumpolar.

Depth.—Surface to 76 fathoms, in mud on beach.

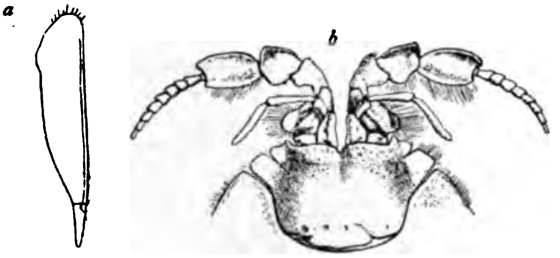


FIG. 377.—MESIDOTEA SABINI (AFTER MIERS). *a*, OPERCULAR VALVE (INNER SIDE). × $\frac{8}{3}$. *b*, HEAD WITH BOTH PAIRS OF ANTENNÆ. × $\frac{7}{3}$.

Body narrow, elongate, broad anteriorly and tapering gradually from the middle of the body to the long, pointed terminal segment. Length of body almost four times its greatest breadth, 11 mm. : 40 mm. Length of abdomen almost half the length of entire body, 19 mm. : 40 mm. These measurements are from a small specimen.

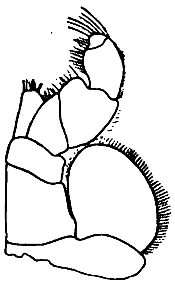
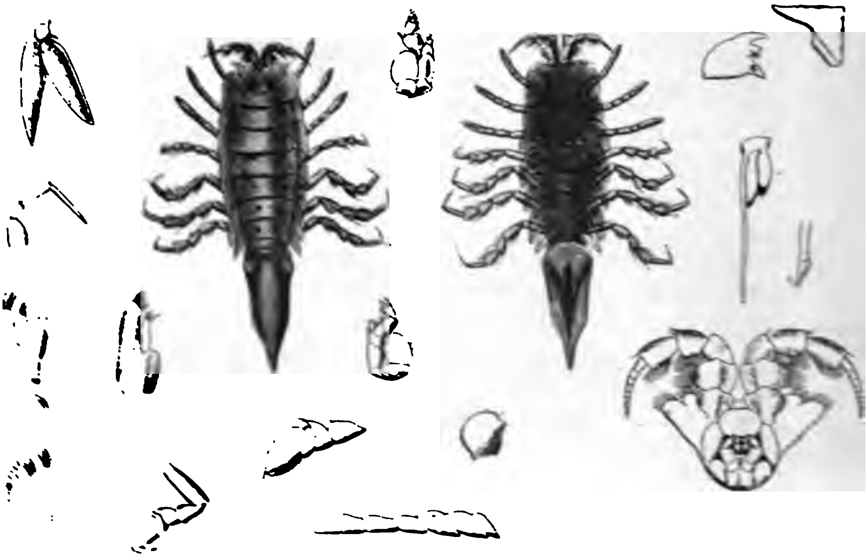


FIG. 378.—MESIDOTEA SABINI. MAXILLIPED. × 11$\frac{1}{4}$.

Head with the lateral margins cleft, the posterior lobe being much the larger and produced some little distance beyond the anterior lobe. Front deeply excavate between the lateral lobes, with a small median excavation also. Eyes absent. First pair of antennæ with the basal article large, triangular in shape, the broad posterior extremity tapering to a narrow apex at the anterior end; the second article is short, about half as long as the basal article; the third is twice as long as the second; the fourth is a little longer than the third. The first antennæ extend to the third peduncular article of the second pair of antennæ. The basal article of the second antennæ is short, not reaching beyond the antero-lateral angles; the second article has the exterior margin produced in a rounded expansion, and is twice as long as the basal article; the third article is only half as long as the second; the fourth is a little longer than the third, and has a large, round expanded process on the inferior margin and a small expansion on the exterior margin; the fifth article is about twice as long as the third, and is broadly expanded. The flagellum consists of six articles. The second pair of antennæ extend to the middle of the first thoracic segment. The maxilliped has a palp of five articles.

The segments of the thorax are about equal in length. The epimera of all the segments from the second to the seventh, inclusive, are distinct and occupy the whole of the lateral margin; they are large plates which in the last four segments are produced into very long, acutely pointed extremities.

The first three pairs of legs are subchelate, with propopus expanded and dactylus reflexed. The last four pairs of legs are ambulatory. The inferior margin of the propodus in the first three pairs of legs is armed with numerous long spines alternating with several short ones.



[illegible] MESIDOTEA SABINI. AFTER KRÖYER, SHOWING DETAILED PARTS.

The abdomen is composed of five segments, four short ones followed by a very long terminal one partly coalesced with the last short segment. The terminal segment tapers to an extremely long, pointed extremity. About halfway from the base to the end of this segment is a slight indication of an angle on either side, possibly rudiments of lateral angles. The opercular valves are each in two parts, a large basal part and a short, narrow, pointed terminal part, the exterior branch; the inner branch is seen on the under side as a small oval lobe at the base on the exterior side of the outer part.

38. Genus CHIRIDOTEA Harger.

[illegible] cleft. [illegible] flagellum [illegible] exception of the first [illegible] separated [illegible] A [illegible] posed of four segments with lateral sutures at the base of the fourth, or terminal segment, indicating another partly coalesced segment. First three pairs of legs prehensile, with propodus dilated and dactylus reflexed. Last four pairs of legs ambulatory.

Inner branch of uropoda half as long as inner branch.

Species small.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CHIRIDOTEA.

a. First pair of antennæ extend beyond the peduncle of the second antennæ. Second antennæ short, extending only to the anterior margin of the first thoracic segment. Front of head not excavate between the antero-lateral lobes, but slightly excavate in the middle of the anterior margin.... *Chiridotea cæca* (Say)

b. First pair of antennæ extend to the middle of the fifth article of the peduncle of the second antennæ. Second antennæ long, extending to the posterior margin of the sixth thoracic segment. Front of head deeply excavate between the antero-lateral angles........................ *Chiridotea tuftsii* (Stimpson)

CHIRIDOTEA CÆCA (Say).

Idotea cæca Say, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 424.—Milne Edwards, Hist. Nat. des Crust., III, 1840, p. 131.—Guérin, Iconog., Crust., 1843, p. 35.—Harger with Verrill, Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, p. 569 (275), pl. v, fig. 22.

Chiridotea cæca Harger, Am. Jour. Sci., XV, 1878, p. 374; Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 338–340, pl. iv, figs. 16–19.

Glyptonotus cæcus Miers, Jour. Linn. Soc. London, XVI, 1883, pp. 17–18.

Chiridotea cæca Richardson, American Naturalist, XXXIV, 1900, p. 226; Proc. U. S. Nat. Mus., XXIII, 1901, p. 539.

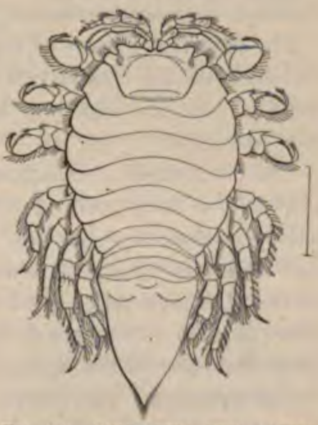


Fig. 380.—Chiridotea cæca (after Harger).

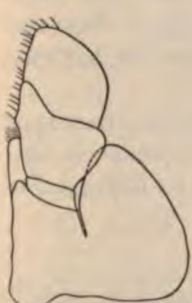


Fig. 381.—Chiridotea cæca. Maxilliped. × 51½.

Localities.—Florida; New Haven, Connecticut; Woods Hole, Massachusetts; Tarpaulin Cove, Naushon; S. W. end of Campobello, New Brunswick; Cohasset, Massachusetts; Long Island Sound; Vineyard Sound; Nantucket, Provincetown, Nahant, Massachusetts; Halifax, Nova Scotia; New England coast.

Depth.—Surface; low water; shore; swimming in fish weir; sand.

Body ovate, broad and short, tapering to a pointed extremity; twice as long as broad, 4 mm. : 8 mm. Length of abdomen, one-half the length of entire body, 4 mm. : 8 mm.

The lateral margins of the head are cleft, the anterior lobe being smaller than the posterior, which projects at the sides beyond the anterior one. The front of the head is not excavate between the antero-lateral lobes, but on the contrary is expanded beyond them. There is a pronounced median excavation, in the center of which is a median point. The eyes are small, round, compound in structure, dorsally placed at the base of the post-lateral lobe. The first antennæ have the basal article very short and not dilated; second article a little longer than the first; third and fourth equal in length and each about twice as long as the first. The first antennæ extend a little beyond the end of the peduncle of the second antennæ. The basal article of the second antennæ is inconspicuous from a dorsal view; the second, third, and fourth articles are subequal; the fifth is a little longer than the fourth. The flagellum consists of five articles. When retracted, the second antennæ reach the anterior margin of the first thoracic segment. The maxillipeds have a palp of three articles.

The segments of the thorax are equal in length. The epimera are separated dorsally from the first three segments, but are not acutely produced posteriorly. The epimera of the last four segments are also distinct, and are produced into acutely pointed processes.

The first three pairs of legs are subchelate, with propodus expanded, the dactylus short and reflexed. The last four pairs of legs are ambulatory. All the legs are thickly beset with spines and hairs along the free margins.

The abdomen is composed of four segments, three short ones followed by a long-pointed terminal one, with lateral sutures of another partly coalesced segment. The apex of the terminal segment is acute and its lateral margins near the extremity are denticulate. The sides of the abdomen taper gradually to about the middle and then converge more rapidly to the apex, forming slight angles on either side halfway from the base to the apex.

The opercular valves are in two parts, the small terminal part representing the outer branch of the uropoda. The inner branch is represented on the under side attached to the basal portion on the exterior side.

CHIRIDOTEA TUFTSII (Stimpson).

Idotea tuftsii Stimpson, Smithsonian Contributions to Knowledge, VI, 1853, p. 39.—Harger with Verrill, Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, p. 340 (46); p. 569 (275).—Verrill, Proc. Amer. Assoc., 1874, p. 362.

Chiridotea tuftsii Harger, Am. Jour. Sci., XV, 1878, p. 374; Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 340–341, pls. IV, figs. 20–23.

Glyptonotus tuftsii Miers, Jour. Linn. Soc. London, XVI, 1883, pp. 18–19.

Chiridotea tuftsii Richardson, American Naturalist, XXXIV, 1900, p. 226; Proc. U. S. Nat. Mus., XXIII, 1901, p. 539.

Localities.—Bay of Fundy; Long Island Sound; Massachusetts Bay; Casco Bay, Maine; Princes Cove, Eastport; Halifax, Nova Scotia; near Halfing Rock, channel outside Bakers Island.

Depth.—Surface to 25 fathoms, in fine sand.

Body ovate, less than twice as long as wide, 3½ mm.: 6 mm.

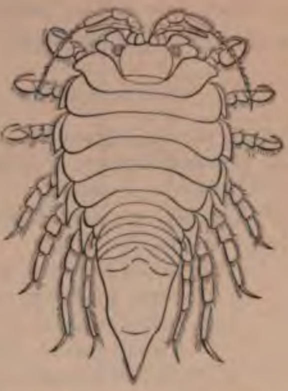


FIG. 382.—CHIRIDOTEA TUFTSII (AFTER HARGER).

Head twice as wide as long, 1 mm.: 2 mm., with the front deeply excavate between the antero-lateral angles, and produced in a small median point.

The sides of the head, where the lateral margin is free, are cleft, the posterior lobe formed by the cleft margin being produced laterally beyond the anterior lobe. The posterior portion of the head is deeply set in the first thoracic segment. The eyes are small, round, composite, and situated just within the cleft on the lateral margin. The first pair of antennæ have the basal article large and somewhat dilated; the second article is one and a half times longer than the first; the third is one and a half times longer than the second; the fourth is as long as the third. The first antennæ extend to the middle of the fifth article of the peduncle of the second pair of antennæ. The second antennæ have the basal article short, and concealed in a dorsal view; the second article is twice as long as the first; the third is a little shorter than the second; the fourth is about as long as the second; the fifth is as long as the third and fourth taken together. The flagellum is composed of 11 or 12 articles in one specimen, of 14 in another specimen, and extends to the posterior margin of the sixth thoracic segment. The palp of the maxillipeds is composed of three articles.

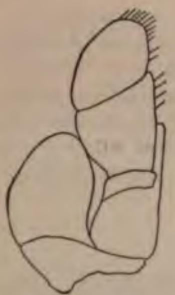


FIG. 383.—CHIRIDOTEA TUFTSII. MAXILLIPED. × 51⅓.

The first segment of the thorax has the antero-lateral parts produced forward to surround the posterior half of the head. The epimera are distinctly separated in all the segments, with the exception of the first, and are wide plates, with the outer post-lateral angles of the last four acutely produced.

The abdomen is composed of four distinct segments, the fourth or terminal segment being 2½ mm. in length and one-half mm. wide at the base, and having lateral sutures, indicative of another partly coalesced segment. It is acutely produced at its posterior extremity.

The first three pairs of legs are prehensile, the last four pairs ambulatory.

59. Genus IDOTHEA Fabricius 1799.

Flagellum of second antennæ multi-articulate. Maxillipeds with a palp composed of four articles. Epimera of all the segments of the thorax, with the exception of the first, distinctly separated from the segments. Abdomen composed of three segments, with a suture line on either side at the base of the terminal segment, indicating another partly coalesced segment.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS IDOTHEA.

a. Body slender, linear, filiform.
  b. Terminal segment of body truncate at its posterior extremity; post-lateral angles not prominent.................................*Idothea gracillima* (Dana)
  b′. Terminal segment of body not truncate at its extremity; post-lateral angles prominent.
    c. Post-lateral angles of terminal segment prominent and separated by a notch from the triangular middle portion.
      d. Terminal segment with middle portion obtuse and produced at the apex in a small point. Lateral angles obtuse.........*Idothea urotoma* Stimpson
      d′. Terminal segment with middle portion of posterior extremity very acutely produced. Lateral angles acute.............*Idothea fewkesi*, new species
    c′. Post-lateral angles not separated by a notch from the subtriangular middle portion, which does not bear a tooth at the middle; the line from the apex to the lateral angle is straight.................*Idothea rectilinea* Lockington
a′. Body oblong-ovate.
  b. Terminal segment of body truncate at its extremity......*Idothea metallica* Bosc
  b′. Terminal segment of body not truncate at its extremity.
    c. The epimera of all the segments, from the second to the seventh inclusive, occupy the entire lateral margins of the segments...*Idothea baltica* (Pallas)
    c′. The epimera of all the segments of the thorax, from the second to the seventh inclusive, do not occupy the entire lateral margins of the segments.
      d. Terminal segment of body with distinct and prominent post-lateral angles. Basal article of the first pair of antennæ very much dilated.
        Idothea ochotensis Brandt
      d′. Terminal segment of body without distinct post-lateral angles, the sides of the abdomen tapering to a pointed extremity. Basal article of first pair of antennæ not dilated...................*Idothea phosphorea* Harger

IDOTHEA GRACILLIMA (Dana).

Stenosoma gracillimum DANA, Proc. Acad. Nat. Sci. Phila., VII, 1854, p. 175.—STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 505.

Idothea gracillima MIERS, Jour. Linn. Soc. London, XVI, 1883, p. 35.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 844; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 264; American Naturalist, XXXIV, 1900, p. 226; Harriman Alaska Expedition, Crust., X, 1904, pp. 216–218; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 661–663.

Localities.—California; Bolinas, California.

The description of this species given by Professor Dana is very short and rather vague. He describes the body as extremely slender and filiform, the thoracic segments subquadrate, head quadrate. He refers to the linear post-abdomen, which is truncated at the apex, three-jointed, and marked on either side with a suture. The antennæ are described as being a little shorter than half the body, with a ten- to twelve-jointed flagellum.

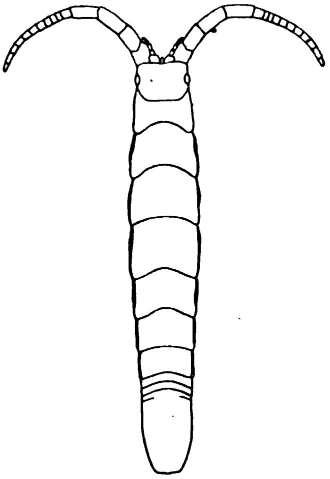


FIG. 384.—IDOTHEA GRACILLIMA. × 5.

A species of *Idothea* was sent to the U. S. National Museum by Doctor Ritter. The specimens, which are eight in number, were collected by him at Bolinas, California. They are more closely allied to *I. gracillima* than to any other known species of *Idothea* from the Pacific coast of North America. Until evidence can be given of their distinctness, I shall consider them identical with *I. gracillima* (Dana).

Body slender, about seven times longer than wide,[a] with the sides nearly parallel. Surface entirely smooth. Color in alcohol uniformly pinkish. A note referring to the color of the specimens in life says that they are green, brown, and striped.

Head quadrate, with rounded antero-lateral margins, and a slight median excavation in the anterior margin. Eyes situated at the extreme lateral edge and about the middle of the head; they are small but distinct. The first pair of antennæ are four-jointed, and extend a little beyond the extremity of the second peduncular joint of the second pair of antennæ. The second pair of antennæ are equal to half the length of the body; the last two joints of the peduncle are subequal; in the smaller specimens the flagellum is composed of ten joints; in the larger ones there are eighteen joints.

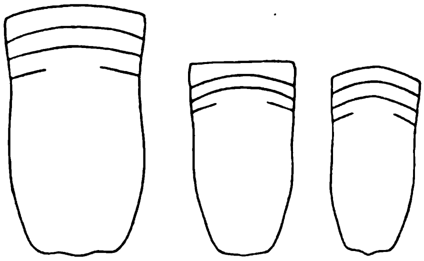


FIG. 385.—IDOTHEA GRACILLIMA. ABDOMEN, SHOWING VARIATIONS IN FORM.

The first thoracic segment is short in the middle but is produced antero-laterally on either side; it is not wider than the head. The second, third, and fourth segments are subequal in length and are longer than the first segment. The fifth, sixth, and seventh segments gradually decrease in length. The epimera of all the segments are extremely narrow; those of the second and third segments extend but half the length of the segment; those of the fourth and fifth segments

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[a] The female is figured. The body is somewhat broader than in the male.

extend three-fourths the length of the segment; those of the last tw segments extend the entire length of the segment.

The abdomen consists of three distinct segments, with suture line on either side of another partly coalesced segment. The third o terminal segment has subparallel sides to about the middle, where th segment gradually becomes narrower to a truncate extremity. O the posterior margin of the terminal segment is a faint indication of double emargination on either side of an obtuse median point.

Legs small and slender and devoid of hairs.

The five small specimens and one large one agree in having th terminal segment as described above. The two larger specimen show the double emargination more distinctly, one of the specimen more so than the other.

Figures showing all three variations are given.

The specimens agree in all other characters.

Dana's specimens were collected by Prof. J. Le Conte on the coas of California.

IDOTHEA UROTOMA Stimpson.

Idotea urotoma STIMPSON, Proc. Acad. Nat. Sci. Phila., XVI, 1864, p. 155.—MIERS Jour. Linn. Soc. London, XVI, 1883, p. 34.—RICHARDSON, Proc. U. S. Nat Mus., XXI, 1899, p. 845; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 264 American Naturalist, XXXIV, 1900, p. 226.

Locality.—Puget Sound.

Body linear, elongate, nearly four and a half times longer than broad 4 mm. : 17½ mm.

Head as wide as first segment of thorax and 2½ mm. long. Eye small, round, and situated close to the lateral margins. The first pai of antennæ have the basal article large, dilated; the second and thir are small and narrow, subequal; the fourth i clavate. The first pair of antennæ extend t the end of the second article of the peduncle o the second pair of antennæ. The joints of th peduncle of the second antennæ are short an thick: the first article is inconspicuous in a dorsal view; the second and third articles ar subequal; the fourth and fifth are subequal an each is about one and a half times longer tha the third article. Flagellum composed of eleve articles.

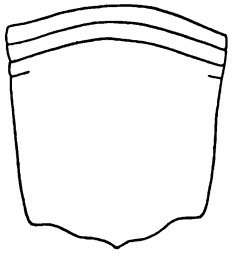

FIG. 386.—IDOTHEA UROTOMA. ABDOMEN. × 6¼.

The first segment of the thorax has the antero-lateral angles pro duced to surround the posterior portion of the head, and is shorte in the middle of the dorsal surface than any of the six followin segments, which are nearly subequal. The epimera of the second third, and fourth segments are narrow plates, which in the second an third segments do not quite reach the middle of the lateral margin but extend fully to the middle on the fourth segment. The epimera of the fifth segment do not quite reach the posterior margin, but extend about three-fourths the length of the segment. The epimera of the last two segments extend the entire length of the segments.

The abdomen is composed of three segments, two short ones anterior to the terminal segment, which has suture lines on either side indicating another partly coalesced segment. The terminal segment is quadrangular with sides nearly parallel. The post-lateral angles are prominent, and are separated by a shallow emargination from the triangular middle portion, which is somewhat acutely produced in the middle.

The legs are all similar in structure.

This description is made from specimens sent me by Dr. Walter Faxon, from the Museum of Comparative Zoology at Harvard University. They were presented by Dr. Alexander Agassiz and are marked *Idothea urotoma* Stimpson in Stimpson's handwriting.

IDOTHEA FEWKESI, new species.

Body narrow, elongate, about five and a half times longer than wide, 7½ mm. : 42 mm.

Head one and a half times wider than long, 4 mm. : 6 mm.; with the anterior margin excavate in the middle between the antero-lateral angles. The eyes are small, composite, about twice as wide as long, and situated at the sides of the head, halfway between the anterior and posterior margins. The first pair of antennæ have the basal article greatly dilated; the second and third articles are subequal, and each is half as wide as the basal article and a little shorter; the fourth article is clavate, and a little longer than the third. The first pair of antennæ extend to the end of the second article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short, the second and third articles are subequal, each being 2 mm. in length; the fourth and fifth are subequal, each being 4 mm. in length, or twice as long as either the second or the third article. The flagellum is composed of sixteen articles and is 10 mm. long. When retracted, the second antennæ extend to the posterior margin of the fourth thoracic segment. They are about half as long as the body. The palp of the maxillipeds is composed of four articles.

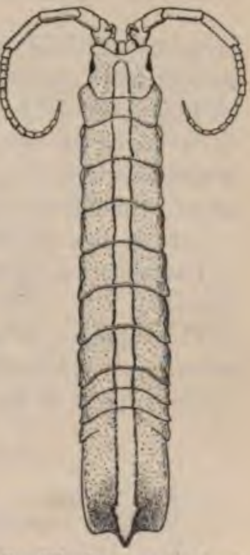

FIG. 387.—IDOTHEA FEWKESI. × ⅔.

The first segment of the thorax is a little shorter in the dorsal median line than any of the others, being 2½ mm. long. The antero-lateral angles of this segment are produced forward so as to surround the posterior portion of the head. The following segments are subequal in length, with the exception of the seventh, which is a little shorter than any of the others. Epimera are distinctly separated on all the segments with the exception of the first. The epimera of the second and third segments occupy half the lateral margin of the segments, being 2 mm. in length. The epimeron of the fourth segment is 2½ mm. in length, the lateral margin of the segment showing below it being 1½ mm. in length. The epimera of the fifth and sixth segments occupy three-fourths of the lateral margin, being 3 mm. in length, the lateral margin of the segment below them being 1 mm. long. The epimeron of the seventh segment only occupies the entire lateral margin. The first three epimera are extremely narrow, being only ½ mm. wide. The last three are 1 mm. wide in the region of their greatest breadth.

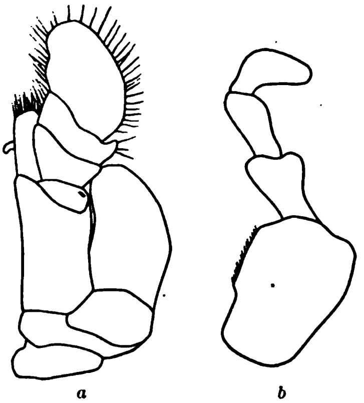

FIG. 388.—IDOTHEA FEWKESI. *a*, MAXILLIPED. × 15½. *b*, FIRST ANTENNA. × 15½.

The abdomen is composed of three segments, two short ones and a long terminal segment, which has a suture line on either side at the base indicative of another partly coalesced segment. The abdomen is twice as long as wide, being 14 mm. long and 7 mm. wide at the base, and is one-third the length of the entire body. The terminal segment has nearly subparallel sides. Its posterior margin is produced in a median point, which is strong and acute. The post-lateral angles are rounded.

All the legs are similar in character.

There are two specimens, one imperfect, from Santa Barbara, California.

This species is named for Dr. J. Walter Fewkes, zoologist and ethnologist, who collected the specimens.

The type is in the Museum of Comparative Zoology, Cat. No. 6730.

IDOTHEA RECTILINEA Lockington.

Idotea rectilinea LOCKINGTON, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 36.—MIERS, Jour. Linn. Soc. London, XVI, 1883, p. 34.

Idotea rectilineata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 845; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 264-265; American Naturalist, XXXIV, 1900, p. 226.

Localities.—Pacific coast from Humboldt County, California, to Ensenada, Lower California.

Depth.—30 to 40 fathoms, in sandy mud.

Body narrow, linear, filiform, about four times longer than wide, 4 mm.: 17 mm.; length of abdomen about one-third that of entire length of body, 6 mm.: 17 mm.

Head wider than long, with anterior margin slightly excavate. Anterior portion of head but slightly wider than posterior portion. Eyes very small, transversely ovate, compound in structure, and situated about the middle of the extreme lateral margin. First pair of antennæ with the basal article enlarged; second and third articles equal in length, and somewhat shorter than the basal joint; fourth article clavate and a little longer than either of the two preceding ones. The first antennæ extend to the middle of the third peduncular article of the second pair of antennæ. The basal article of the second antennæ is scarcely visible from a dorsal view; the second and third articles are of equal length; the fourth and fifth are subequal and each is about twice as long as the third. The flagellum is composed of thirteen long, slender articles. When retracted, the second antennæ extend to the posterior margin of the fourth thoracic segment. The maxilliped has a palp of four articles.

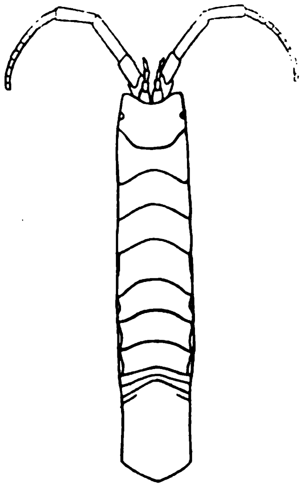

FIG. 389.—IDOTHEA RECTILINEA.

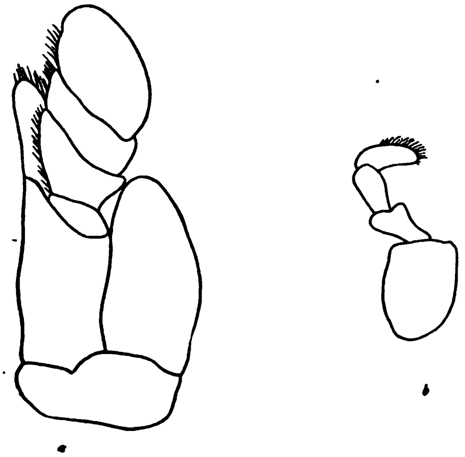

FIG. 390.—IDOTHEA RECTILINEA. *a*, MAXILLIPED. × 23. *b*, FIRST ANTENNA. × 23.

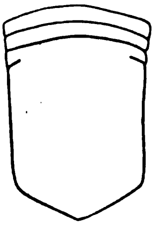

FIG. 391.—IDOTHEA RECTILINEA. ABDOMEN. × 6¼.

The segments of the thorax are about equal in length, the first one only being a little shorter than the others. The first segment is not wider than the head. The epimera of the second, third, and fourth segments occupy the anterior half of the segments, and are very narrow; the epimeron of the fifth segment occupies the anterior two-thirds part of the segment; the epimera of the last two segments occupy the entire lateral margin.

The legs are all similar in structure. Along the inferior margin of the merus, carpus, and propodus are a few hairs.

The first two segments of the abdomen are short, followed by one long rectilinear segment. The sides of the abdomen are almost parallel, the posterior end being three-fourths as wide as the anterior end. The posterior extremity of the terminal segment is produced in a very obtuse point, which does not extend far beyond the lateral angles.

IDOTHEA METALLICA Bosc.

Idotea metallica Bosc, Hist. Nat. Crust., II, 1802, p. 179, pl. xv, fig. 6.—Latreille, Hist. Nat. Crust. et Insectes, VI, 1803, p. 373.

Idotea peloponesiaca Roux, Crust. de la Mediterranée, 1828, pl. xxx, figs. 10–12.

Idotea atrata Costa, Fauna del R. Napoli, Crust., 1838, pl. xi, fig. 3.

Idotea rugosa Milne Edwards, Hist. Nat. Crust., III, 1840, p. 131.

Idotea compacta White, List. Crust. Brit. Mus., 1847, p. 95.

Idotea algirica Lucas, Anim. artic. in Expl. Sci. Algérie, I, Crust., 1849, p. 61, pl. vi, fig. 2.

Idotea robusta Krøyer, Naturh. Tidsskr. (2) II, 1846–49, p. 108; Voy. en Scand., Crust., 1849, pl. xxvi, fig. 3.—Reinhardt, Naturhistorisk Bidrag til en Beskrivelse af Grönland, 1857, p. 35.—Stimpson, Proc. Acad. Nat. Sci. Phila., 1863, p. 133.—Verrill, Am. Jour. Sci., II, 1871, p. 360.—Harger with Verrill, Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, p. 439; p. 569, pl. v, fig. 24.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 160; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, p. 349, pl. vi, figs. 30–32.

Idotea metallica Miers, Jour. Linn. Soc. London, XVI, 1883, pp. 35–38 (see Miers for synonymy).—Hansen, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 188.—Dollfus, Feuille des jeunes Naturalistes, 1895, p. 8, fig. 24.—Richardson, American Naturalist, XXXIV, 1900, p. 226; Proc. U. S. Nat. Mus., XXIII, 1901, p. 541.—Norman, Ann. Mag. Nat. Hist. (7), XIV, 1904, p. 443.

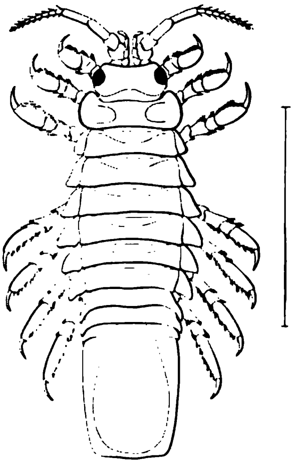

Fig. 392.—Idothea metallica (after Harger). × 2.

Localities.—Off Maryland; Chesapeake Bay; North Carolina; Florida Keys; Newport, Rhode Island; Long Island; Nantucket; Vineyard Sound; Woods Hole, Massachusetts; Massachusetts Bay; Georges Banks; Jeffries Bank; near Isles of Shoals; Halifax, Nova Scotia; La Have Bank; off No Mans Land; south of Block Island; off Marthas Vineyard; latitude 64° 46′ north, longitude 53° 35′ west; also, Mediterranean Sea; southwestern Ireland; between Greenland and Iceland; between Montevideo and Straits of Magellan; New South

Wales; Borneo; off Cape Negro; Latitude Cove, Patagonia; 40 miles south of Cape Sable.

Depth.—Surface to 91 fathoms.

From floating fucus.

Body oblong-ovate, about two and one-fourth times as long as wide, 8 mm. : 18 mm.

Abdomen a little more than two-fifths the entire length of body, 8 mm. : 18 mm.

Head wider than long, with anterior margin slightly excavate. The posterior portion is somewhat wider than the anterior portion. Eyes large and round, compound in structure, and situated at the extreme lateral margin. First pair of antennæ with the basal article not enlarged, the first and second articles being about equal in length and width. The third and fourth articles are somewhat longer than either the first or the second article. The first antennæ extend to the end of the second article of the peduncle of the second pair of antennæ. The first article of the second pair of antennæ is very short; the second and third are subequal; the fourth is one and a half times longer than the third, and the fifth is twice as long as the third. The flagellum is composed of eight articles and reaches when retracted to the anterior margin of the third thoracic segment. The maxilliped has a palp of four articles.

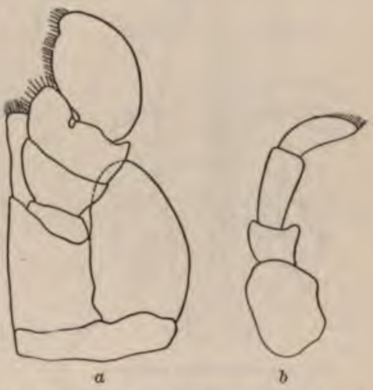

FIG. 393.—IDOTHEA METALLICA. *a*, MAXILLIPED. × 27½. *b*, FIRST ANTENNA. × 15½.

The segments of the thorax are subequal. The first segment extends a little beyond the lateral margins of the head on either side. The lateral portions of this segment and of those following are curved outward and somewhat upward, forming an angle with the portion of the segment to which it is adjacent. The epimera of all the segments, from the second to the seventh, inclusive, extend the entire length of the segment. The epimera are large and very wide, increasing in width to the seventh, which is wider than long.

The legs are all more or less alike in character. The free margins of all the joints and the inferior margin of the propodus is furnished with hairs. The abdomen has two short segments and one long terminal one, with lateral rudiments at its base of another partly coalesced segment. The terminal segment has the sides converging slightly to a truncate extremity.

IDOTHEA BALTICA (Pallas).[a]

Oniscus balticus Pallas, Spic. Zool. (9), 1772, pp. 67–68, pl. iv, fig. 6.

Idotea entomon Pennant, British Zool., IV, 1877, p. 25, pl. xviii, fig. 5.

Stenosoma irrorata Say, Journ. Acad. Nat. Sci. Phila., I, 1818, p. 423.

Idotea tricuspidata Desmarest, Dict. des Sci. Nat., XXVIII, 1823, p. 373, pl. xlvi, fig. 11; Consid. Crust., 1825, p. 289, pl. xlvi, fig. 11.—Roux, Cr. de la Mediterranée, 1828, pl. xxix, figs. 11, 12.—Gould, Rep. Geol. Mass., 2d ed., 1835, p. 549.—Milne Edwards, Hist. Nat. Crust., III, 1840, p. 129.

Idotea irrorata Milne Edwards, Hist. Nat. Crust., III, 1840, p. 132.

Stenosoma irrorata Gould, Rep. Invert. Massachusetts, 1841, p. 338.—De Kay, Zool. New York Fauna, Crust., Pt. 6, 1844, p. 43, pl. x, fig. 42.

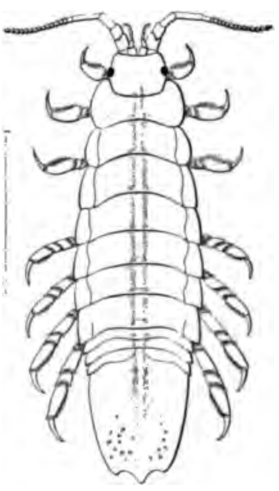

Fig. 394.—Idothea baltica (After Harger). × 2.

Idotea irrorata Stimpson, Smithsonian Contributions to Knowledge, VI, 1853, p. 39.—Leidy, Journ. Acad. Nat. Sci. Phila., 1855, p. 150.

Idotea tricuspidata Sars, Forh. Vidensk. Selsk. Christ., 1859, p. 151.—Norman, Report British Assoc., 1868, p. 197.—Bate and Westwood, British Sessile-eyed Crust., II, 1868, p. 379.

Idotea irrorata Harger with Verrill, Report U. S. Fish Comm., 1873, Pt. 1, p. 569, pl. v, fig. 23; p. 316.—Verrill, Am. Journ. Sci. Arts (3), VII, 1874, pp. 131, 134; Proc. Amer. Assoc., 1874, pp. 369, 371, 373.—Whiteaves, Am. Journ. Sci. Arts (3), VII, 1874, p. 217.

Idotea tricuspidata Stebbing, Journ. Linn. Soc. London, Zool., XII, 1874, p. 148.

Idotea irrorata Harger, Proc. U. S. Nat. Mus., II, 1879, p. 160; Report U. S. Fish Comm., Pt. 6, 1880, p. 343, pl. v, figs. 24–26.

Idotea marina Miers, Journ. Linn. Soc. London, Zool., XVI, 1883, pp. 25–31.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 540.

Idotea tricuspidata Dollfus, Feuilles des jeunes Naturalistes, 24th year 1893–1895, p. 55.

Idotea baltica Sars, Crust. Norway, II, 1899, pp. 80–81, pl. xxxii.—Norman, Ann. Mag. Nat. Hist. (7), XIV, 1904, pp. 441–442.

Idotea marina Paulmier, Bull. New York State Museum, 1905, pp. 175–176.

Localities.—Atlantic coast from Nova Scotia and Gulf of St. Lawrence to North Carolina; Bermudas; Barbados; also Mediterranean, Black, and Caspian seas; west coast of Europe to Great Britain; shores of the Netherlands; in German Ocean and Baltic Sea; Bohuslan, Sweden (W. Sachs); Runmarö, Stockholms skärgård (J. Lindahl); on Scandinavian and Finland coasts; South America, at Desterro and Rio Janeiro, Brazil; New Zealand; Red Sea; Java.

Found on surface, on floating seaweed, among algæ and eelgrass, in sand and gravel; from stomach of smelt, *Osmerus mordax*.

Depth.—Surface to 119 fathoms.

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[a] I have accepted the name adopted by Sars for this form, *Oniscus marinus* Linnæus being more properly applied to a species belonging to the genus *Jæra*, as Sars has suggested. Although *Oniscus tridens* Scopoli is earlier than *Oniscus balticus*, it probably refers to another species of *Idothea*, as Dollfus has pointed out.

Body oblong, ovate, almost three times longer than wide, 7 mm. : 20 mm.; length of abdomen a little more than one-third that of entire body, 8 mm. : 20 mm.

Head wider than long, slightly excavate in front. Eyes large, round, compound in structure, and situated just anterior to the median transverse line on the anterior portion of the head, at the extreme lateral margin. First pair of antennæ with the basal article not expanded, and equal in length to the second article; third and fourth articles slightly longer than either of the preceding ones. First antennæ extend to the end of the third peduncular article of the second pair of antennæ. The basal article of the second antennæ is short; the second and third articles are about equal in length; the fourth is very little longer than the third; the fifth is about twice as long as the third. The flagellum consists of fourteen articles. When retracted, the second antennæ extend to the middle of the third thoracic segment. The maxillipeds have a palp of four articles.

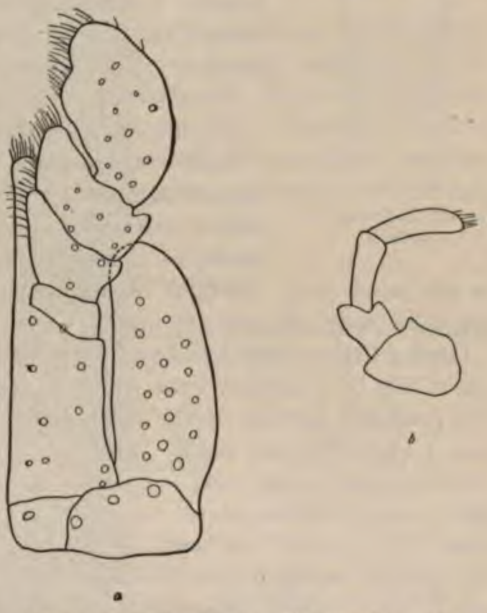

FIG. 395.—IDOTHEA BALTICA. *a* MAXILLIPED. × 41. *b* FIRST ANTENNA. × 23.

The segments of the thorax are about equal in length, with the exception of the first, which is some what shorter than any of the others. The epimera of all the segments occupy the entire lateral margins of the segments. They are in the form of large, broad plates, gradually increasing in width from the first to the sixth.

The legs are more or less alike in structure, and have a few hairs on the inferior margins.

The abdomen has two short segments followed by a long terminal one with sutures at the base. The sides of the abdomen converge to a narrow extremity, the width of which is to the base of the abdomen as 2:5. The posterior margin of the terminal segment is produced in the middle in an acute point, extending some distance beyond the lateral angles. Color varies greatly, being sometimes uniformly light or dark green, or brown and often striped with a median longitudinal stripe of a light color and a marginal stripe on either side, or with only marginal stripes. The colors are occasionally arranged in tra verse bands or blotches.

IDOTHEA OCHOTENSIS Brandt.

Idotea ochotensis Brandt, Middendorff's Sibirische Reise, II, 1851, Crust., p. 145, pl. VI, fig. 33.—Miers, Jour. Linn. Soc. London, XVI, 1883, p. 32, pl. I, figs. 8-10.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 846; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 265; American Naturalist, XXXIV, 1900, p. 227; Harriman Alaska Expedition, Crust., X, 1904, p. 219; Proc. U. S. Nat. Mus., XXVII, 1904, p. 663; Bull. U. S. Fish Comm., 1905, p. 216.

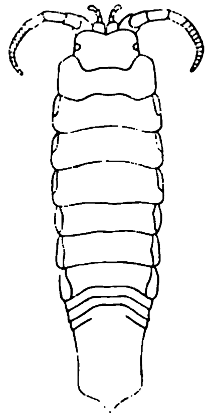

Fig. 396.—Idothea ochotensis.

Localities.—Awaatsch Bay, Sea of ,Ochotsk; northwest coast of North America to Vancouver Island; Lands End and Fort Point, California; Humboldt Bay on Popof Island; Karta Bay; Port Renfrew, British Columbia (J. Lindahl).

From mouth of sculpin; in sand.

Depth.—Surface; beach; low water; 7-18 fathoms.

Body oblong-ovate, about three and a half times longer than wide, 12 mm.: 42 mm. Sides of thorax nearly parallel; abdomen tapering slightly, the posterior extremity being about four-fifths as wide as the basal part. Length of abdomen about two-fifths the entire length of body, 16 mm.: 42 mm.

Head a little wider than long, with the anterior margin sinuate. On either side of a median excavation is another very slight excavation. The posterior portion of the head is not wider than the anterior portion. The eyes are small, transversely ovate, compound, and situated on the extreme lateral margin about the middle of the head. The first pair of antennæ have the basal article very much dilated; it is longer and about twice as wide as any of the following articles. The first antennæ reach almost to the end of the second article of the peduncle of the second pair of antennæ. The basal article of the second pair of antennæ is almost inconspicuous from a dorsal view. The second and third articles are about equal in length. The last two articles are about one and a half times longer than the third article and are subequal. The flagellum consists of about eleven short articles. The second antennæ when retracted reach only to the middle of the third thoracic segment. The maxillipeds have a palp of four articles.

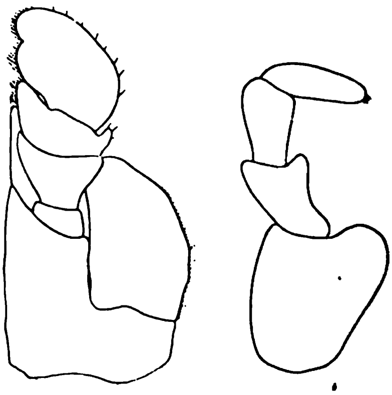

Fig. 397.—Idothea ochotensis. *a*, Maxilliped. × 15½. *b*, First antenna. × 15½.

The first segment of the thorax is wider than the head, and produced

anteriorly at the sides to surround the posterior portion of the head. All the segments are equal in length. The epimeron of the second segment extends half the length of the lateral margin; it is broader at its anterior end than at its posterior end. The epimera of the third and fourth segments occupy the anterior two-thirds of the lateral margin.
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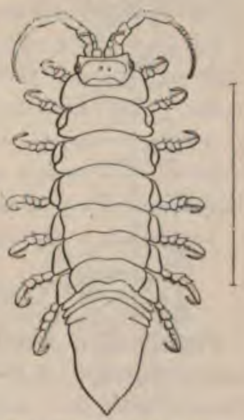

FIG. 398.—IDOTHEA PHOSPHOREA (AFTER HARGER). × 2.

Depth.—Surface to 18 fathoms. Found among seaweed; part of contents of haddock stomach.

Body oblong-ovate, three times longer than broad, 7 mm.: 21 mm. Length of abdomen a little more than one-third the entire length of the body, 8 mm.: 21 mm.

Head broader than long, with the anterior margin straight on either side of a slight median excavation. The eyes are moderately large, round, compound in structure, and placed just in front of the median transverse line at the extreme lateral margin. Basal article of first

IDOTHEA OCHOTENSIS Brandt.

Idotea ochotensis BRANDT, Middendorff's Sibirische Reise, II, 1851, Crust., p. 145, pl. VI, fig. 33.—MIERS, Jour. Linn. Soc. London, XVI, 1883, p. 32, pl. I, figs. 8-10.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 846; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 265; American Naturalist, XXXIV, 1900, p. 227; Harriman Alaska Expedition, Crust., X, 1904, p. 219; Proc. U. S. Nat. Mus., XXVII, 1904, p. 663; Bull. U. S. Fish Comm., 1905, p. 216.

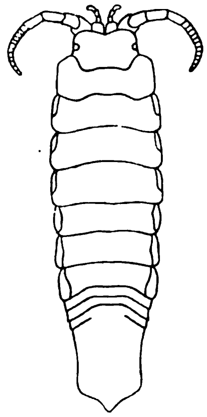

FIG. 396.—IDOTHEA OCHOTENSIS.

Localities.—Awaatsch Bay, Sea of Ochotsk; northwest coast of North America to Vancouver Island; Lands End and Fort Point, California; Humboldt Bay on Popof Island; Karta Bay; Port Renfrew, British Columbia (J. Lindahl).

From mouth of sculpin; in sand.

Depth.—Surface; beach; low water; 7-18 fathoms.

Body oblong-ovate, about three and a half times longer than wide, 12 mm.: 42 mm. Sides of thorax nearly parallel; abdomen tapering slightly, the posterior extremity being about four-fifths as wide as the basal part. Length of abdomen about two-fifths the entire length of body, 16 mm.: 42 mm.

Head a little wider than long, with the anterior margin sinuate. On either side of a median excavation is another very slight excavation. The posterior portion of the head is not wider than the anterior portion. The eyes are small, transversely ovate, compound, and situated on the extreme lateral margin about the middle of the head. The first pair of antennæ have the basal article very much dilated; it is longer and about twice as wide as any of the following articles. The first antennæ reach almost to the end of the second article of the peduncle of the second pair of antennæ. The basal article of the second pair of antennæ is almost inconspicuous from a dorsal view. The second and third articles are about equal in length. The last two articles are about one and a half times longer than the third article and are subequal. The flagellum consists of about eleven short articles. The second antennæ when retracted reach only to the middle of the third thoracic segment. The maxillipeds have a palp of four articles.

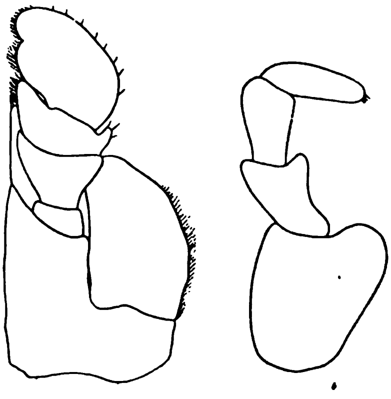

FIG. 397.—IDOTHEA OCHOTENSIS. *a*, MAXILLIPED. × 15½. *b*, FIRST ANTENNA. × 15½.

The first segment of the thorax is wider than the head, and produced anteriorly at the sides to surround the posterior portion of the head. All the segments are equal in length. The epimeron of the second segment extends half the length of the lateral margin; it is broader at its anterior end than at its posterior end. The epimera of the third and fourth segments occupy the anterior two-thirds of the lateral margin. The epimeron of the fifth segment extends almost the entire length of the lateral margin of the segment. The epimera of the sixth and seventh segments reach the posterior extremity of the lateral margin, and are broader at the posterior end than at the anterior end. The legs are all similar. The inferior margin of the merus, carpus, and propodus is densely furnished with hairs.

The abdomen has two short segments and one long terminal one with lateral rudiments of another partly coalesced segment. The terminal segment tapers to about the middle, and from that point to the post-lateral angles, the sides are nearly parallel. The lateral angles are rounded. The posterior margin is produced in an obtuse median process, triangulate in shape, and extending some distance beyond the lateral angles. The apex of this process is rounded.

IDOTHEA PHOSPHOREA Harger.

Idotea phosphorea HARGER with Verrill, Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, p. 569 (275); p. 316 (22).—VERRILL, Am. Jour. Sci., 1874, pp. 43, 45, 131; Proc. Amer. Assoc., 1874, pp. 362, 367, 369.—WHITEAVES, Am. Jour. Sci., VII, 1874, p. 218.—HARGER, Proc. U. S. Nat. Mus, II, 1879, p. 160; Report U. S. Commissioner of Fish and Fisheries, Pt. 6, 1880, pp. 347–348, pl. v, figs. 27–29.

Idotea marina var. *phosphorea* MIERS, Journ. Linn. Soc. London, Zoology, XVI, 1883, pp. 31–32.

Idotea phosphorea RICHARDSON, American Naturalist, XXXIV, 1900, p. 227; Proc. U. S. Nat. Mus., XXIII, 1901, p. 541.—PAULMIER, Bull. New York State Museum, 1905, pp. 176–177.

Localities.—Coast of New England to Halifax, Nova Scotia, and the Gulf of St. Lawrence; Runmarõ, Stockholms Skãrgård (J. Lindahl).

Depth.—Surface to 18 fathoms. Found among seaweed; part of contents of haddock stomach.

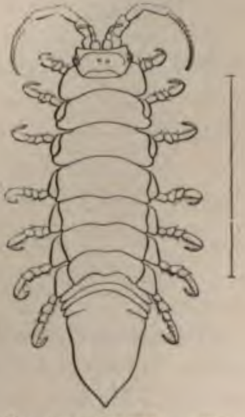

FIG. 398.—IDOTHEA PHOSPHOREA (AFTER HARGER). × 2.

Body oblong-ovate, three times longer than broad, 7 mm.: 21 mm. Length of abdomen a little more than one-third the entire length of the body, 8 mm.: 21 mm.

Head broader than long, with the anterior margin straight on either side of a slight median excavation. The eyes are moderately large, round, compound in structure, and placed just in front of the median transverse line at the extreme lateral margin. Basal article of first pair of antennæ not dilated, and but little wider than second article. First, second, and third articles about equal in length; fourth article a little longer than any of the others. The first antennæ extend to the end of the third peduncular article of the second pair of antennæ. The basal article of the second antennæ is almost inconspicuous; the second and third articles are subequal; the fourth is about one and a half times longer than the third; the fifth is a little longer than the fourth. The flagellum consists of sixteen articles. When retracted, the second antennæ extend to the posterior margin of the third thoracic segment. The maxillipeds have a palp of four articles.

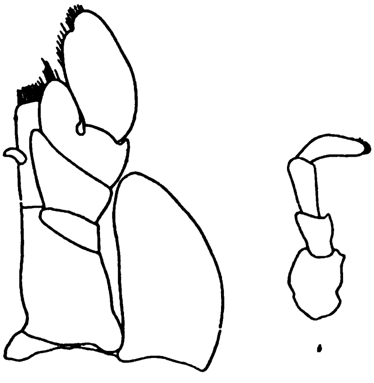

FIG. 399.—IDOTHEA PHOSPHOREA. *a*, MAXILLIPED. × 27½. *b*, FIRST ANTENNA. × 15½.

The segments of the thorax are subequal, except the first, which is shorter in the median dorsal line. The epimera of the second and third segments occupy the anterior two-thirds of the lateral margin; the epimeron of the fourth segment occupies about four-fifths of the lateral margin; the epimera of the last three segments occupy the entire lateral margin and are increasingly broader at the posterior end.

The legs are more or less similar in structure, and are furnished with hairs along the inferior margin of the merus, carpus and propodus. The first two segments of the abdomen are short, followed by a long terminal one with lateral sutures at the base. The terminal segment tapers to a pointed extremity, on either side of which is an indication of a rudimentary lateral angle. Color usually dark green or brownish, with transverse patches of yellow.

60. Genus PENTIDOTEA, new genus.

Flagellum of second antennæ multi-articulate. Maxillipeds with a palp composed of five articles. Epimera of all the segments of the thorax with the exception of the first distinctly separated from the segments. Abdomen composed of three segments, with a suture line on either side of the terminal segment at the base, indicating another partly coalesced segment.

There are as yet but four species of this genus, all agreeing in having the palp of the maxillipeds composed of five articles.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS PENTIDOTEA.

a. Terminal segment of body with a deep emargination at its posterior extremity, the post-lateral angles formed being very acute....*Pentidotea resecata* (Stimpson)

a′. Terminal segment of body not emarginate at its posterior extremity.

b. Terminal segment of body regularly and broadly rounded at its posterior extremity, with a very small and obtuse median tooth. Epimera of the second, third, and fourth segments do not extend quite the entire length of the segments. Those of the following segments occupy the entire lateral margin. *Pentidotea wosnesenskii* (Brandt)

b′. Terminal segment of body with pronounced post-lateral angles, which are rounded, and with a distinct and acute median tooth at its posterior extremity.

  c. Sides of thorax parallel. Eyes about twice as wide as long. Epimera of all the segments, from the second to the seventh, inclusive, occupy the entire lateral margins of the segments .... *Pentidotea whitei* (Stimpson)

  c′. Sides of thorax arcuate. Eyes transversely elongated, being five times wider than long. The first three epimera do not quite reach the post-lateral angles of the segments .... *Pentidotea stenops* (Benedict)

PENTIDOTEA RESECATA (Stimpson).

Idotea resecata STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 504, pl. XXII, fig. 7; Proc. Bost. Soc. Nat. Hist., 1859, p. 88.—MIERS, Jour. Linn. Soc. London, XVI, 1883, p. 45.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 844; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 263-264; American Naturalist, XXXIV, 1900, p. 226; Harriman Alaska Exp., Crust., X, 1904, p. 216; Proc. U. S. Nat. Mus., XXVII, 1904, p. 661; Bull. U. S. Fish Comm., 1905, p. 216.

Localities.—Straits Juan de Fuca, opposite Port Townsend, Vancouver Island; Fort Rupert and Barclay Sound, British Columbia; Gulf of Georgia, Orcas Island; Ottar Bay, Pender Island; Pacific Grove; Santa Barbara; San Pedro; Humboldt Bay, and Monterey Bay, California; Tomales Bay, California; Kilisut Harbor, Port Townsend; Mawawshone Point, near Port Townsend; Quarantine Dock, Port Townsend; Karta Bay; Gulf of Georgia.

Depth.—Surface to 3½ fathoms. Found between high and low tide lines among rocks, seaweed, kelp, eelgrass, etc.

Body narrow, elongate, four and a half times longer than wide, 8 mm.: 36 mm.; length of abdomen one-third that of entire body, 12 mm.: 36 mm.

Head but little wider than long, with frontal margin slightly excavate. Eyes moderately large, round, compound in structure, and situated just in front of the median transverse line on the anterior portion of the head, and at the extreme lateral margin. First pair of antennæ with the basal articles greatly enlarged. The three following articles are slender and about equal in length to each other and to the basal article. The first antennæ extend to the end of the third article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short and almost inconspicuous from a dorsal view; the

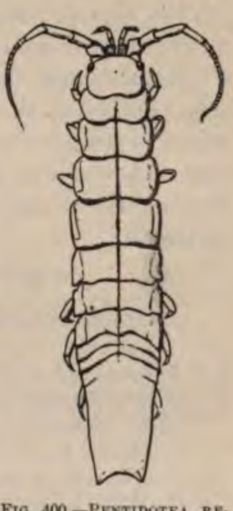

FIG. 400.—PENTIDOTEA RESECATA (AFTER STIMPSON). × 1½.

second and third articles are of equal length; the fourth is almost twice as long as the third; the fifth is slightly shorter than the fourth. The flagellum consists of twelve articles. The maxilliped has a palp of five articles.

The first and seventh segments of the thorax are equal in length and shorter than any of the others. The third and fourth segments are the longest. The first segment is very little wider than the head; the antero-lateral angles are produced to surround the posterior portion of the head. The epimera of the second, third, and fourth segments do not occupy the whole of the lateral margin of the segment; those of the second and third segments occupy the anterior two-thirds, that of the fourth segment, the anterior three-fourths part; the epimera of the three following segments occupy the entire lateral margin. All the epimera are large and conspicuous from a dorsal view.

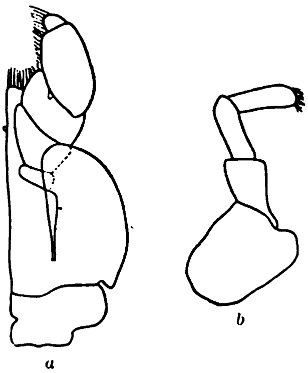

FIG. 401.—PENTIDOTEA RESECATA. *a*, MAXILLIPED. × 15¼. *b*, FIRST ANTENNA. × 15¼.

The legs are similar in structure and furnished with hairs on the inferior margin of the merus, carpus, and propodus. The basis of all the legs is provided with a carinate process.

The abdomen has two short segments and one long one with lateral sutures at the base. The posterior margin of the terminal segment is deeply excavate, the lateral angles being acutely produced. The sides of the abdomen converge slightly from the base to about the middle of the segment, and then converge again slightly at the extremity.

PENTIDOTEA WOSNESENSKII (Brandt).

Idotea wosnesenskii BRANDT, Middendorff's Sibirische Reise, II, 1851, Crust., p. 146.

Idotea hirtipes DANA, U. S. Expl. Exp., Crust., XIV, 1853, p. 704, pl. XLVI, fig. 6.

Idotea oregonensis DANA, Proc. Acad. Nat. Sci. Phila., VII, 1854, p. 175.

Idotea wosnesenskii STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 504.—SPENCE BATE, Lord's Naturalist in British Columbia, II, 1866, p. 281.

Idotea media (Dana?) SPENCE BATE, Lord's Naturalist in British Columbia, II, 1866, p. 282.

Idotea wosnesenskii MIERS, Jour. Linn. Soc. London, XVI, 1883, p. 40.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 846; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 265; American Naturalist, XXXIV, 1900, p. 227; Harriman Alaska Expedition, Crust., X, 1904, p. 218; Proc. U. S. Nat. Mus., XXVII, 1904, p. 663; Bull. U. S. Commission of Fish and Fisheries, 1905, p. 216.

Localities.—Sea of Ochotsk and Kamchatka Sea; west coast of North America to Monterey Bay, California; Dutch Harbor on Unalaska Island; White Water Bay, Alaska; Humboldt Bay on Popoff Island;

Yakutat; Glacier Bay; Garforth Island in Muir Inlet and Sitka, Alaska; Beaver Cove on Vancouver Island; Land's End, California; Gabnola Island; Taylor Bay; Boca de Quadra; Head of Mink Arm; San Francisco, California; Gulf of Georgia; Farallone Islands, California; Fort Point, San Francisco, California; Port Renfrew, British Columbia. (R. Osburn.)

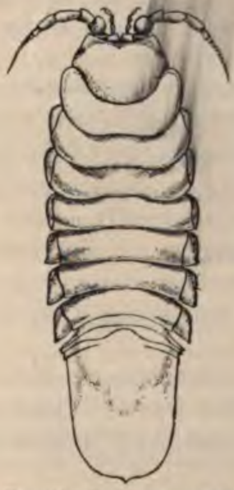

FIG. 402.—PENTIDOTEA WOSNESENSKII. MALE.

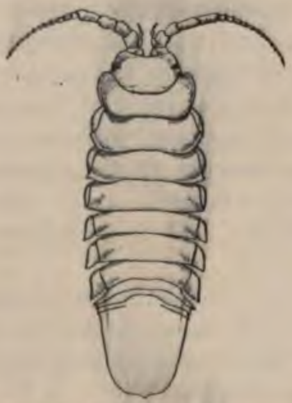

FIG. 403.—PENDITOTEA WOSNESENSKII. FEMALE.

Depth.—Surface to 9 fathoms. Found at low tide, on beach, in sand and rocks; under stones.

Body oblong-ovate, with the sides of the thorax nearly parallel; length, three times its greatest breadth, 11 mm.: 32 mm. Length of abdomen about three-eighths the entire length of body, 13 mm.: 32 mm. Head wider than long, with frontal margin slightly excavate; posterior portion somewhat wider than anterior portion. Eyes small, compound, transversely ovate, and situated at the extreme lateral margin, about halfway between the anterior and posterior margins. The first pair of antennæ are composed of four articles; the basal article is about twice as broad as any of those following; the first, second, and third articles are about equal in length; the fourth is a little longer and clavate in shape. The first antennæ extend a little beyond the middle of the third article of the peduncle of the second pair of antennæ. The second pair of antennæ have

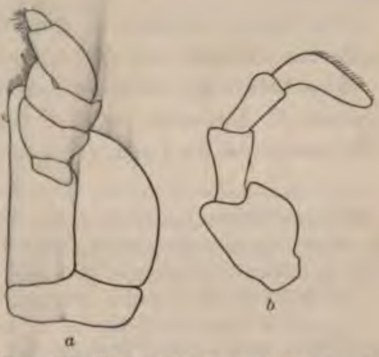

FIG. 404.—PENTIDOTEA WOSNESENSKII. *a*, MAXILLIPED. × 15½. *b*, FIRST ANTENNA. × 15½.

a peduncle of five articles and a flagellum of sixteen articles. The basal article is short; the second and third are of equal length, and longer than the first; the last two are one and a half times longer than the third, and subequal. The flagellum consists of sixteen articles. The maxillipeds have a palp of five articles.

The thoracic segments are all equal in length. The epimera of the second, third, and fourth segments do not extend the entire length of the lateral margins, but occupy more than three-fourths of the margin. The anterior portion of the segment at the sides is excavate for the epimeron, and the posterior portion projects laterally as far as the exterior margin of the epimeron. The epimera of the last three segments occupy the entire lateral margin, and are increasingly wider posteriorly. All the epimera are large and conspicuous from a dorsal view.

The legs are similar in structure, and in the male are thickly furnished with hairs on the free margins of the joints. Those of the female have the propodus only furnished with thick bristles on the inferior margin.

The abdomen has two short segments, followed by one large terminal segment, which has lateral rudiments of another partly coalesced segment. The posterior portion of the segment is regularly and broadly rounded, with a very small obtuse median point, rounded at the apex.

The upper division of the opercular valves is crossed obliquely by a carina formed by the thickened anterior portion.

The following observations and measurements were made by Dr. James E. Benedict several years ago and intended for publication. He has given me permission to publish them here.

An examination of numerous lots from California to Alaska appear to show that the sexual differences are more marked in this than is usual in species of the genus.

Dana's figure is undoubtedly that of a male and agrees well with the specimens in the collection. The legs of the male are densely covered with hair; their heads are broad and very prominent. The outline of the thorax is but little arcuate. The abdomen is broad and but little tapering. The heads of the females are much smaller in proportion to the size and width of the animal than in the males. The abdomens are more tapering and the third and fourth segments of the thorax are wider, giving the animal a suboval outline. The terminal outlines of the abdomens of both sexes are alike.

In sorting the different lots preserved in alcohol the males can usually be separated from the females by the color alone, the larger yellow specimens always proving to be males, while the dark colored ones are usually, though not always, females, and in this collection commonly with eggs. Some lots contain a large excess of one sex or the other, while in other lots the sexes are associated in more even numbers. No females were found with hair on the legs or a well-developed male without it.

Doctor Stimpson says: "An exceedingly common species of a dark-green color found among seaweeds on rocky or stony shores between high-water and half-tide marks."

Measurements of a female 25 mm. long.

	mm.
Width of head at the outer margin of eyes	4.5
Width of first thoracic segment	6.5
Width of second thoracic segment	8
Width of third and fourth thoracic segments	9
Width of fifth thoracic segment	8.5
Width of sixth thoracic segment	8
Width of seventh thoracic segment	7.5
Length of abdomen	10.5
Length of antenna with flagellum	9

Measurements of a male 28.5 mm. long.

	mm.
Width of head	5.5
Width of first thoracic segment	7.5
Width of second thoracic segment	8
Width of third, fourth, fifth, and sixth thoracic segments	9
Width of seventh thoracic segment	8.5
Length of abdomen	11
Length of antenna with flagellum	10

Measurements of a male 35 mm. long.

	mm.
Width of head	6.5
Width of first thoracic segment	9
Width of second thoracic segment	9.5
Width of third, fourth, fifth, and sixth thoracic segments	10.5
Width of seventh thoracic segment	10
Length of abdomen	13
Length of antenna with flagellum	10

PENTIDOTEA WHITEI (Stimpson).

Idotea whitei Stimpson, Proc. Acad. Nat. Sci. Phila., 1864, p. 155.—Miers, Jour. Linn. Soc. London, XVI, 1883, pp. 42–43.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, pp. 846–847; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 266; American Naturalist, XXXIV, 1900, p. 227.

Localities.—Puget Sound; Monterey Bay, California. From *Mytilus.*

Body narrow, elongate, with sides almost parallel; length equal to a little over three times its greatest breadth, 11 mm.:34 mm. Length of abdomen a little more than one-third that of entire body, 12 mm.:34 mm.

Head wider than long, with frontal margin very slightly excavate; posterior portion not wider than anterior portion. Eyes moderately large, transversely ovate, compound, and placed close to the lateral margin, about halfway between the anterior and posterior margins. The first pair of antennæ have four articles; the basal article is twice as broad as any of those following and a little longer; the next two articles are nearly of equal length; the last one is clavate and somewhat longer than either of the preceding ones. The first antennæ do not extend beyond the second article of the peduncle of the second pair of antennæ. The second pair of antennæ have a peduncle composed of five articles and a flagellum of seventeen articles. The first article of the peduncle is short, not reaching beyond the basal article of the first pair of antennæ; the next two articles are equal in length, and each is twice as long as the first article; the last two articles are each nearly twice as long as the third article. The maxillipeds have a palp of five articles.

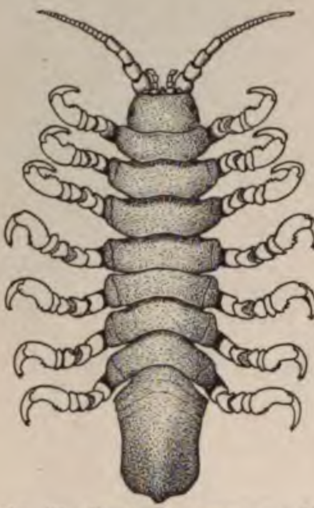

FIG. 405.—PENTIDOTEA WHITEI. × 1¼.

The segments of the thorax are all of equal length. The epimera of all the segments, from the second to the seventh, inclusive, extend the entire length of the lateral margin. The epimeron of the second segment is somewhat broader anteriorly than posteriorly; the epimeron of the third segment and that of the fourth also are the same width throughout their length; those of the last three segments are increasingly wider posteriorly.

All the legs are similar in structure; the propodus is furnished with numerous stiff bristles along the proximal half of the inferior margin.

The abdomen is composed of two short segments and a long terminal one having lateral rudiments of another partially coalesced segment. The terminal segment has the sides somewhat concave, the post-lateral angles rounded, and an acute median terminal point triangularly produced with apex rounded. The opercular valves are in two parts each; a long anterior portion, crossed obliquely by a faint carina, and a short posterior portion.

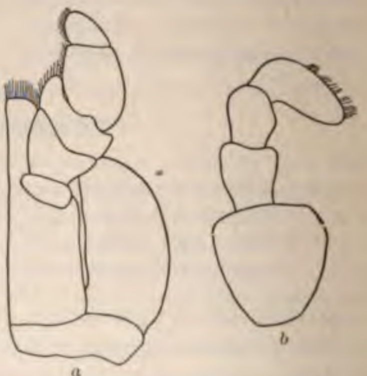

FIG. 406.—PENTIDOTEA WHITEI. *a*, MAXILLIPED. × 15¼. *b*, FIRST ANTENNA. × 15¼.

Only one specimen of this species, a male, was collected at Monterey Bay by Mr. Harold Heath. It agrees in every detail with Stimpson's and Mier's descriptions. No figure has ever been given.

PENTIDOTEA STENOPS (Benedict).

Idotea stenops BENEDICT, Proc. Biol. Soc. Washington, XII, 1898, pp. 54–55.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 846; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 266; American Naturalist, XXXIV, 1900, p. 227; Harriman Alaska Exp. Crust., X, 1904, p. 219; Proc. U. S. Nat. Mus., XXVII, 1904, p. 663.

Locality.—Monterey Bay, California.

Body oblong-ovate, nearly three times as long as wide, 15 mm.: 42 mm.

Head nearly twice as wide as long, 4 mm.: 7 mm. Frontal margin slightly excavate between the antero-lateral angles. The eyes are transversely elongated, being five times as wide as long and are situated at the sides of the head. The basal article of the first antennæ is greatly dilated; the three following articles are short and nearly subequal. The first pair of antennæ extend to the end of the second article of the peduncle of the second pair of antennæ. The first article of the second pair of antennæ is short and does not extend beyond the basal article of the first pair of antennæ; the second and third articles are subequal; the fourth and fifth articles are also subequal and each is a little longer than either of the two preceding articles. The flagellum is composed of fifteen articles. The second antennæ extend to the posterior margin of the second thoracic segment. The maxillipeds have a palp composed of five articles.

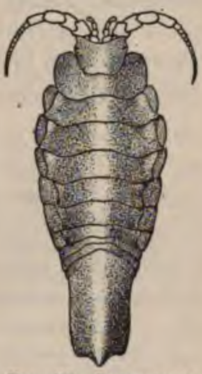

FIG. 407.—PENTIDOTEA STENOPS (AFTER BENEDICT).

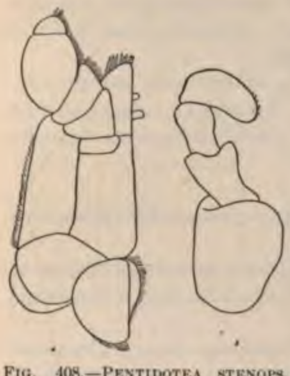

FIG. 408.—PENTIDOTEA STENOPS. *a*, MAXILLIPED. × 11½. *b*, FIRST ANTENNA. × 11½.

The first segment of the thorax has the lateral parts expanded and produced anteriorly, surrounding the posterior half of the head. The second, third, and fourth segments are subequal and longer than the first, fifth, and sixth segments, which are subequal. The seventh segment is a little shorter than the sixth. The epimera are distinctly separated on all the segments with the exception of the first. The first three occupy almost the entire lateral margin, the epimera being 5 mm. long, and the post-lateral angle of the segment occupying ½ mm. of the lateral margin below the epimeron. The last three epimera occupy the whole of the lateral margin; they are very broad, the last two being broader posteriorly than anteriorly.

The abdomen is composed of three segments—two short ones, followed by a long terminal segment which has at its base a suture line on either side, indicating another partly coalesced segment. The terminal segment is 10 mm. wide at the base. The sides converge from the base to a point about the middle, where the segment is 8 mm. in width. From the middle to the extremity the abdomen is of equal width. The abdomen terminates in an extremity, which is acutely pointed in the middle of the posterior margin and has the post-lateral angles pronounced and rounded, but not produced.

All the legs are similar in structure.

61. Genus SYNIDOTEA Harger.

Flagellum of second antennæ multi-articulate. Palp of maxillipeds composed of three articles. Epimera of all the thoracic segments perfectly and firmly united with the segments. In the last three segments there is sometimes a faint depression marking the place of coalescence. The abdomen is composed of a single segment, with a suture line on either side at the base indicating another partly coalesced segment.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS SYNIDOTEA.

- *a.* Terminal segment of body emarginate or notched at the extremity.
  - *b.* Two spines or tubercles overhanging the frontal notch.
    - *c.* Antero-lateral processes produced horn-like...... *Synidotea ritteri* Richardson
    - *c′.* Antero-lateral processes not produced horn-like.
      - *d.* Spines united near the base .... *Synidotea pallida* Benedict
      - *d′.* Spines free at base.............................. *Synidotea erosa* Benedict
  - *b′.* No spines or tubercles overhanging the frontal notch.
    - *c.* With a low ridge arising between the eyes and interrupted on the median line.
      - *d.* Outlines of abdomen subparallel............... *Synidotea nebulosa* Benedict
      - *d′.* Outlines of abdomen strongly arcuate......... *Synidotea angulata* Benedict
    - *c′.* Without a ridge between the eyes.
      - *d.* Outline of abdomen subtriangular.
        - *e.* Front not excavated.................... *Synidotea consolidata* (Stimpson)
        - *e′.* Front excavated.
          - *f.* Outlines of thorax subparallel.......... *Synidotea marmorata* (Packard)
          - *f′.* Outlines of thorax strongly arcuate........ *Synidotea bicuspida* (Owen)
      - *d′.* Outlines of abdomen rounded.
        - *e.* Length of abdomen equal to width at base... *Synidotea laticauda* Benedict
        - *e′.* Length of abdomen equal to one and one-half times the width at base. *Synidotea harfordi* Benedict
- *a′.* Abdomen pointed.
  - *b.* Undulations of the body not tubercular or spiny.
    - *c.* Tubercle in front of the eyes not margined....... *Synidotea nodulosa* (Krøyer)
    - *c′.* Tubercle on the frontal margin and forming a part of it. *Synidotea lævis* Benedict
  - *b′.* Undulations of the body tubercular and spiny.
    - *c.* Four spines on the front of the head; body spinous. *Synidotea muricata* (Harford)
    - *c′.* A wedge-shaped tubercle behind the frontal notch; body tubercular. *Synidotea picta* Benedict

SYNIDOTEA RITTERI Richardson.

Synidotea ritteri RICHARDSON, Harriman Alaska Exp. Crust., X, 1904, pp. 219-220; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 663-665.

Locality.—Lands End, San Francisco, California.

Body ovate in outline. Color yellow, with markings of black; terminal segment almost entirely black.

Head with prominent rounded antero-lateral angulations, at base of which, and just above the eyes, is a conspicuous horn-like projection, hook-shaped, directed upward and forward, one on either side of the head. In the median excavation of the frontal margin on either side of the median line is a prominent tubercle. Between the eyes and in line with them on the posterior portion of the head are two low tubercles. The eyes are situated at the extreme lateral margins on the posterior portion of the head, and are somewhat elevated above the surface; they are black and conspicuous, and composed of many ocelli. The first pair of antennæ consist of four joints, the last joint clavate and fringed with hairs. The second pair of antennæ have a five-jointed peduncle and a flagellum composed of eight joints; the third joint of the peduncle has a prominent tubercle.

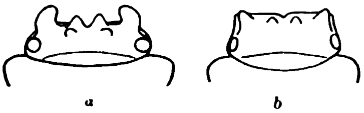

FIG. 409.—*a*, HEAD OF SYNIDOTEA RITTERI. *b*, HEAD OF SYNIDOTEA CONSOLIDATA.

The first four segments of the thorax are longer than the last three. The lateral parts of all the segments are widely expanded, with margins well rounded. The lateral parts are not separated from the dorsal portion of the segments, but are firmly anchylosed.

The abdomen consists of one segment, with suture marks, one on either side, indicative of another partly coalesced segment; it tapers gradually to a broadly rounded extremity, which is slightly excavate in the median line.

The seven pairs of legs are but sparingly furnished with hairs. The upper half of the opercular valve is black, the lower half yellow. There are three longitudinal lines of low swellings on the body, one median, the other two placed one on either side of the median line.

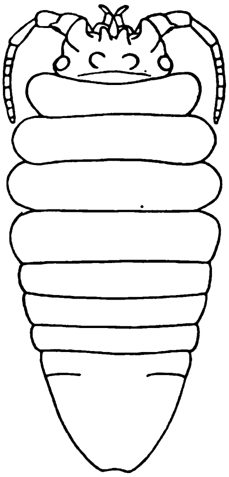

FIG. 410.—SYNIDOTEA RITTERI. × 10.

Only one specimen was taken at Lands End, California, by Doctor Ritter and party.

This species is closely allied to *Synidotea consolidata* (Stimpson),[a]

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[a] Proc. Cal. Acad. Sci., I, 1856, p. 97; Bost. Jour. Nat. Hist., VI, 1857, p. 503.

but differs from that species in the shape and greater size of the tubercles in front of the eyes, the tubercles being hook-shaped and very prominent in *S. ritteri* and projecting far in front of the anterior margin of the head, while in *S. consolidata* they are small (Stimpson speaks of them as being minute), are not hooked, and do not project any considerable distance in front of the anterior margin of the head; in the greater size of the two median tubercles on the anterior division of the head (Stimpson does not mention these tubercles in his description, but in the specimens sent to the U. S. National Museum from Pacific Grove, California, by Mr. J. O. Snyder, and which Dr. James E. Benedict has identified with *S. consolidata* and figured in his paper on the genus *Synidotea*,[a] these tubercles are present, but very minute; they do not overhang the frontal emargination); in the shape of the terminal segment of the body, it being much broader, and tapering very gradually to a broadly rounded extremity, which has a slight median notch or excavation in *S. ritteri*, while in *S. consolidata* the terminal segment of the body is narrower and tapers to an extremity marked by two pronounced teeth or angulations separated by a deep median notch.

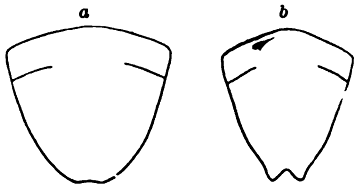

FIG. 411.—*a*, ABDOMEN OF SYNIDOTEA RITTERI. *b*, ABDOMEN OF SYNIDOTEA CONSOLIDATA.

Specimens of the same size were taken in making the above comparisons.

This species is named for Dr. William E. Ritter, of the University of California, from whom the specimens were received.

SYNIDOTEA PALLIDA Benedict.

Synidotea pallida BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, pp. 396–397.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 848; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 268; American Naturalist, XXXIV, 1900, p. 227.

Locality.—Chirikof Island, Alaska.

Depth.—695 fathoms.

Body narrow, elongate, about two and a half times longer than wide, 5 mm.: 12 mm. Length of abdomen equal to less than half the length of the entire body, 5 mm.: 12 mm.

Head with the front excavate between the antero-lateral angles. The sides of the head are produced in a wide border, the exterior margin of which is straight. There are four tubercles on the anterior portion of the head, two in the center, one on either side of the median longitudinal line, and two lateral to these, one in front of each eye. The eyes are round and composite, and placed at the base of the lateral

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[a] Proc. Acad. Nat. Sci. Phila., 1897, p. 393.

expansion, so that they seem more dorsal in position. The first antennæ have the basal article not enlarged; the second is about equal in length to the first; the third and fourth are subequal, and each is about one and a half times longer than the third. The first pair of antennæ extend to the end of the fourth peduncular article of the second pair of antennæ. The basal article of the second pair of antennæ is almost inconspicuous from a dorsal view; the second article is short; the third, fourth, and fifth are progressively longer, each being one and a half times longer than the preceding article. The flagellum consists of ten articles. When retracted, the second antennæ extend to the posterior margin of the third thoracic segment. The maxillipeds have a palp of three articles. The first four segments of the thorax are longer than the last three. The epimera of all the segments are firmly united with the segments. Three longitudinal rows of tubercles, one median and two lateral, extend the entire length of the thorax. The tubercles in the lateral rows are more pronounced. In a transverse line the tubercles are arranged three on each segment.

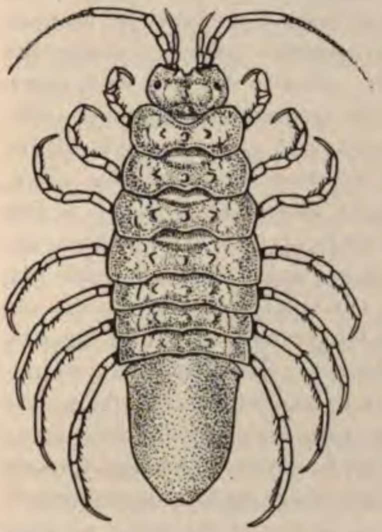

FIG. 412.—SYNIDOTEA PALLIDA (AFTER BENEDICT). × 2½.

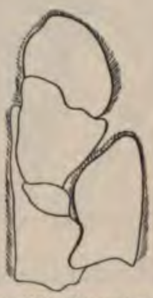

FIG. 413.—SYNIDOTEA PALLIDA. MAXILLIPED. × 27½.

The abdomen is composed of a single segment with lateral sutures at the base indicating another partly coalesced segment; it is elongate with the posterior extremity rounded. There is a very slight indication of a median excavation at the posterior end.

The legs are more or less similar in structure.

SYNIDOTEA EROSA Benedict.

Synidotea erosa BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, pp. 396-397.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 848; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 268; American Naturalist, XXXIV, 1900, p. 227.

Locality.—Sannakh Island, Alaska.

Depth.—483 fathoms.

Body oblong-ovate, three times longer than wide, 7 mm.: 21 mm.

Head wider than long, 2½ mm.: 5 mm., with the anterior margin deeply excavate between the antero-lateral angles. The eyes are small, round, composite, and situated on either side, some distance from the lateral margin, which is expanded to form a narrow border. Two prominent tubercles, one on either side of the median line are placed just behind the anterior margin, from which position they overhang the frontal notch. Just in front of each eye is a low tubercle almost inconspicuous. Between the eyes, one on either side of the median line, are two large but low elevations. Back of these elevations is a low ridge. The first pair of antennæ have the first two articles short and subequal; the last two are subequal, and each is one and a half times longer than either of the two preceding articles. The first pair of antennæ extend to the middle of the fourth article of the peduncle of the second pair of antennæ. The first two articles of the second pair of antennæ are short and subequal; the third and fourth are subequal and each is about twice as long as either of the two preceding articles; the fifth is one and a half times longer than the fourth. The flagellum is composed of seventeen articles. The maxillipeds have a palp of three articles.

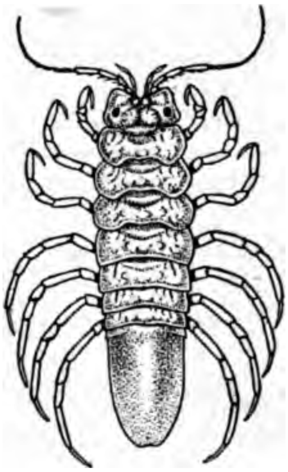

FIG. 414.—SYNIDOTEA EROSA (AFTER BENEDICT). × 2.

The second, third, and fourth segments of the thorax are subequal and are the longest, each being about ½ mm. longer than any of the other segments, which are nearly subequal, the seventh being a little shorter than the sixth. The epimera of all the segments are firmly united with the segments, and there is no indication of a separation. On each segment of the thorax, on either side of the median line and a short distance from the lateral margin, is a low elevation, which in the first segment at its anterior portion is produced into two low tubercles.

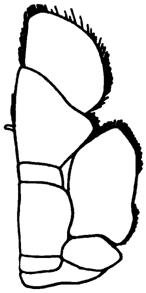

FIG. 415.—SYNIDOTEA EROSA. MAXILLIPED. × 15½.

The abdomen is composed of a single segment, which has a suture line at its base on either side; it is 7½ mm. long, about one-third the entire length of the body, and is 5 mm. wide. It tapers to a rounded extremity, which has a small and shallow median excavation, almost inconspicuous.

All the legs are similar in structure.

SYNIDOTEA NEBULOSA Benedict.

Synidotea nebulosa Benedict, Proc. Acad. Nat. Sci. Phila., 1897, pp. 397–399.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 848; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 268; American Naturalist, XXXIV, 1900, p. 227.

Localities.—Unalaska; Kyska Harbor; Semidi Islands; Unimak Island; Bering Sea; Kamschatka; Constantine Harbor, Alaska; East of Amak Island, Alaska.

Depth.—6 to 32 fathoms.

Body ovate, a little more than twice as long as wide, 5 mm.: 11 mm. Length of abdomen a little more than one-third the length of the entire body, 4 mm.: 11 mm. Head, first four segments of thorax, and abdomen dark in color, the surface being densely covered with small black marks. The last three segments of the thorax are much lighter in color, being a light brown with only a few scattered markings of black.

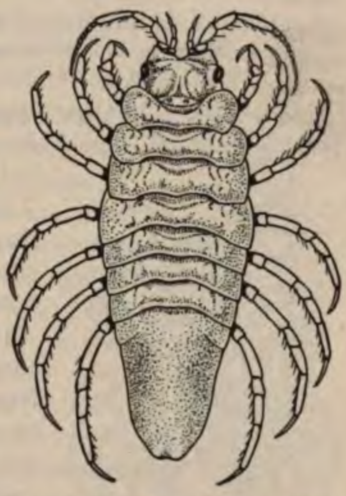

Fig. 416.—Synidotea nebulosa (After Benedict). × 3.

The front of the head is almost straight, with only a very small median excavation. The anterior portion of the head is slightly narrower than the posterior portion. The lateral margins are straight. The eyes are large and round, composite in structure, and placed about the middle of the head near the lateral margins. The first pair of antennæ have the first and second articles about equal in length, the first article not being dilated; the third and fourth are subequal and each is about one and a half times longer than the second. The first antennæ extend to the end of the fourth article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is almost inconspicuous from a dorsal view; the second article is short, not much longer than the first; the third is but little longer than the second; the fourth and fifth are subequal and each is twice as long as the third. The flagellum consists of six articles. When retracted, the second antennæ extend to the posterior margin of the second thoracic segment. The maxilliped has a palp of three articles.

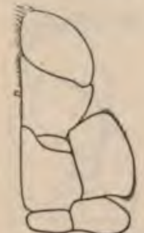

Fig. 417.—Synidotea nebulosa. Maxilliped. × 27½.

The first four segments of the thorax are longer than the last three. All the epimera of all the segments are firmly united with the segments. The lateral margins of the segments are somewhat rounded.

The abdomen is composed of one segment with suture lines at the base indicating another partly coalesced segment. It is rounded posteriorly with the extremity truncate or slightly emarginate.

The legs are more or less similar in structure.

SYNIDOTEA ANGULATA Benedict.

Synidotea angulata BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, pp. 395–396.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 848; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 268; American Naturalist, XXXIV, 1900, p. 227.

Localities.—Off Cape Johnson, Washington; off Destruction Island, Washington; off Cape Flattery, Washington.

Depth.—31 to 38 fathoms.

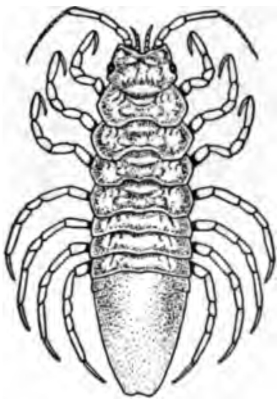

FIG. 418.—SYNIDOTEA ANGULATA (AFTER BENEDICT). × 4.

Body narrow, elongate, three times longer than wide, 4 mm. : 12 mm. Length of abdomen one-third the length of the entire body, 4 mm. : 12 mm.

Head with a deep excavation between the antero-lateral angles. Just posterior to the frontal excavation is a ridge produced into two low tubercles, one on either side of the median line. Eyes large and round, composite, and placed about the middle of the head near the lateral margins. The basal article of the first antennæ is not expanded and is about as long as the second article; the third and fourth are subequal and each is about one and a half times longer than the second. The first pair of antennæ extend a little beyond the end of the third article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short and almost inconspicuous from a dorsal view; the second article is also short; the third and fourth are about equal in length and each is twice as long as the second; the fifth is nearly twice as long as the preceding article. The flagellum consists of twelve articles. When retracted the second pair of antennæ extend to the posterior margin of the third thoracic segment. The maxilliped has a palp of three articles.

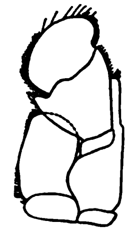

FIG. 419.—SYNIDOTEA ANGULATA. MAXILLIPED. × 27½.

The second, third, and fourth segments of the thorax are longer than the others. All the epimera of all the segments are firmly united with the segments. The lateral portions of the first four segments are expanded laterally with margins angulate. The last three segments have straight lateral margins.

The abdomen is composed of one segment with lateral sutures at the base, indicating another partly coalesced segment. The posterior portion is rounded, with apex slightly excavate.

The legs are more or less similar in structure.

SYNIDOTEA CONSOLIDATA (Stimpson).

Idotea consolidata STIMPSON, Proc. Cal. Acad. Sci., I, 1856, p. 89; Bost. Jour. Nat. Hist., VI, 1857, p. 503.

Edotea bicuspida MIERS, Jour. Linn. Soc. London, XVI, 1883, p. 66.

Synidotea consolidata BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, p. 393.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 848; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 268; American Naturalist, XXXIV, 1900, p. 227.

Locality.—Pacific Grove, California.

Body ovate, twice as long as broad, 4 mm.: 8 mm. Length of abdomen, 3 mm.

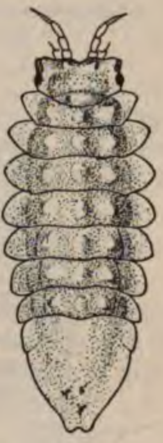

FIG. 420.—SYNIDOTEA CONSOLIDATA (AFTER BENEDICT). × 6.

Head with a slight median excavation. Posterior to the median notch are two small tubercles on either side of the median line. Lateral to these tubercles and in front of the eyes are two larger tubercles, one on either side. Between the eyes in a transverse line are two small tubercles, one on either side of the median line and a little farther apart than the two anterior tubercles. Posterior to these two tubercles in the middle of the head is one small tubercle in the median line close to the posterior margin. The eyes are large and round, composite in structure, and placed close to the lateral margins. The basal article of the first pair of antennæ is short and not dilated; the first, second, and third articles are about equal in length; the fourth is nearly twice as long as the third. The first antennæ extend to the end of the third article of the peduncle of the second antennæ. The basal article of the second pair of antennæ is almost inconspicuous; the second is short; the third and fourth are increasingly longer than the second; the fifth is about one and a half times longer than the fourth. The flagellum consists of eight articles. When retracted the second antennæ extend to the middle of the third thoracic segment.

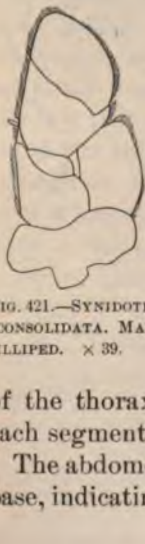

FIG. 421.—SYNIDOTEA CONSOLIDATA. MAXILLIPED. × 39.

The second, third, and fourth segments of the thorax are longer than the others. The epimera of all the segments are firmly united with the segments. The lateral portions of the segments are expanded and the lateral margins rounded in outline. Three longitudinal rows of low tubercles extend the entire length of the thorax, one median row and one on either side of this. On each segment these tubercles are situated in a transverse row of three.

The abdomen is composed of one segment, with lateral sutures at the base, indicating another partly coalesced segment. There are two very small tubercles in longitudinal series in the median line at the base of this segment. The sides of the abdomen converge gradually to a narrow extremity, which has a deep median excavation.

SYNIDOTEA MARMORATA (Packard).

Idotea marmorata PACKARD, Mem. Bost. Soc. Nat. Hist., I, 1867, p. 296, pl. VIII, fig. 6.—WHITEAVES, Canad. Nat., 1875, p. 262.

Idotea bicuspida STREETS and KINGSLEY, Bull. Essex Inst., IX, 1877, p. 108.

Synidotea bicuspida HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 160; Report U. S. Comm. of Fish and Fisheries, Pt. 6, 1880, p. 352.

Edotea bicuspida MIERS, Jour. Linn. Soc. London, XVI, 1883, p. 66.

Synidotea marmorata BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, p. 392.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 542.—ORTMANN, Proc. Acad. Nat. Sci. Phila., 1901, p. 156.

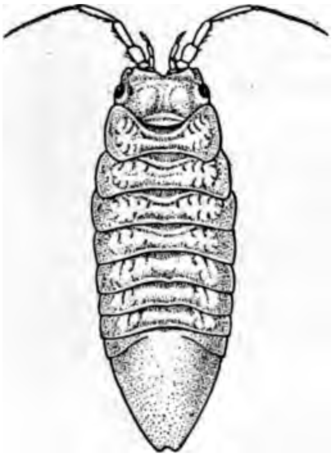

FIG. 422.—SYNIDOTEA MARMORATA (AFTER BENEDICT). × 2½.

Localities.—Labrador; Grand Bank; Battle Harbor, Labrador.

Depth.—12 to 129 fathoms.

Body ovate, two and three-eighths times longer than broad, 8 mm.: 19 mm. Length of abdomen nearly equal to one-third the entire length of the body, 6 mm.: 19 mm.

Head with a deep median excavation or notch. On either side of the median notch the front is produced anteriorly and has the lateral portion bend downward, forming an angle with the dorsal portion. The eyes are large and round, composite in structure, and placed about the middle of the head at the extreme lateral margins. The first pair of antennæ have the basal articles long, not expanded, and about equal in length to the second article; the third is a little longer than the second; the fourth is about as long as the second. The first antennæ extend a little beyond the third article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short, and almost inconspicuous from a dorsal view; the second article is also short; the third is twice as long as the second; the fourth is one and a half times longer than the third; the fifth is one and a half times longer than the fourth. The flagellum consists of fourteen articles. When retracted, the second antennæ extend to the middle of the fourth thoracic segment. The maxilliped has a palp of three articles.

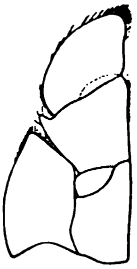

FIG. 423.—SYNIDOTEA MARMORATA. MAXILLIPED. × 20½.

The four anterior segments of the thorax are longer than the last three. The epimera of all the segments are consolidated with the segments. The lateral margins are almost straight and continuous.

The abdomen is composed of one segment, with lateral sutures at the base, indicating another partly coalesced segment; it tapers to a narrow extremity, the apex of which is emarginate.

The legs are more or less alike in structure.

SYNIDOTEA BICUSPIDA (Owen).

Idotea bicuspida OWEN, Crustacea of the *Blossom*, 1839, p. 92, pl. XXVII, fig. 6.
Idotea pulchra LOCKINGTON, Proc. Cal. Acad. Sci., VII, 1877, p. 44.
Edotea bicuspida MIERS, Jour. Linn. Soc. London, XVI, 1883, p. 66.
Synidotea bicuspida SARS, Crust. Norwegian North Atlantic Exp., 1885, p. 116, pl. X, figs. 24-26.—BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, pp. 391-392.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 848; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 268; American Naturalist, XXXIV, 1900, p. 228.

Localities.—West coast of Alaska and Bering Sea; Kara Sea (Hansen).

Depth.—3½ to 81 fathoms, in mud, sand, and gravel; from sponges.

Body ovate, about twice as long as wide, 12 mm.: 25 mm. Length of abdomen equal to one-third the entire length of body, 8 mm.: 24 mm.

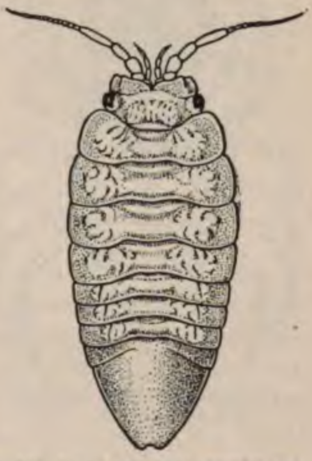

FIG. 424.—SYNIDOTEA BICUSPIDA (AFTER BENEDICT). × 2.

Head with front produced on either side of a median excavation in a wide border, the lateral portion of which forms an angle with the dorsal portion. Eyes large, compound, and situated about the middle of the head at the extreme lateral margin. The first pair of antennæ have the basal article short and not dilated; the second and fourth are about equal in length and not longer than the first article; the third is a little longer than any of the others. The first pair of antennæ extend to the middle of the third peduncular article of the second pair of antennæ. The basal article of the second antennæ is inconspicuous from a dorsal view; the second article is about as long as the first; the third and fourth are each about twice as long as the second; the fifth is nearly as long as the third and fourth together. The flagellum consists of fifteen articles. The second antennæ extend to the posterior margin of the third thoracic segment. The maxillipeds have a palp of three articles.

The segments of the thorax are subequal along the median dorsal line. The first is perhaps a little shorter. The epimera of all segments are coalesced with the segments, with no indication separation on the first four segments. On the last three segments, however, there is a faint line indicating this. The lateral margins of the segments are straight.

The segments of the abdomen are all coalesced to form one large terminal segment. At the base of this segment is a suture line on either side, indicating another partly coalesced segment. The terminal segment is triangulate, with apex excavate, forming two blunt teeth or angles.

The legs are more or less similar in structure.

SYNIDOTEA LATICAUDA Benedict.

Synidotea laticauda Benedict, Proc. Acad. Nat. Sci. Phila., 1897, pp. 393–394.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 849; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 268; American Naturalist, XXXIV, 1900, p. 228.

Locality.—San Francisco Bay.

Body oblong-ovate, a little more than two and a half times longer than wide; 7½ mm.: 17½ mm.

Head wider than long; 2½ mm.: 4 mm., with the anterior margin almost straight. Eyes small, round, composite, and situated at the sides of the head. The first pair of antennæ have the first three articles short and subequal. The fourth article is two and a half times longer than any of the preceding ones. The first antennæ extend to the end of the third article of the peduncle of the second antennæ. The first two articles of the second antennæ are subequal; the third and fourth are subequal, and each is about twice as long as the second; the fifth article is one and a half times longer than the fourth. The flagellum is composed of seventeen articles. When retracted the second antennæ extend to the posterior margin of the fifth thoracic segment. The maxillipeds have a palp composed of three articles.

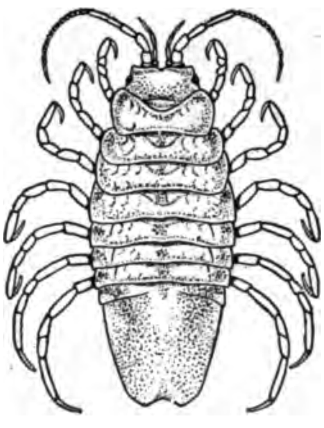

Fig. 425.—Synidotea laticauda (after Benedict). × 2¼.

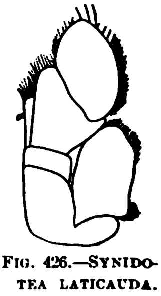

Fig. 426.—Synidotea laticauda. Maxilliped. × 15¼.

The first, fifth, sixth, and seventh segments of the thorax are subequal in length. The second, third, and fourth are subequal and are longer than the others, each being one-half millimeter longer than either the first, fifth, sixth, or seventh segments. The epimera of all the segments are perfectly and firmly coalesced with the segments, with no indication of a separation.

The abdomen is composed of a single segment, with a suture line on either side at the base. The segment becomes somewhat narrower toward the extremity, which has a broad but shallow excavation or notch.

The legs are all similar in structure.

SYNIDOTEA HARFORDI Benedict.

Idotea marmorata HARFORD, Proc. Cal. Acad. Sci., VII, 1877, p. 117.

Synidotea harfordi BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, p. 402.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 849; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 269.

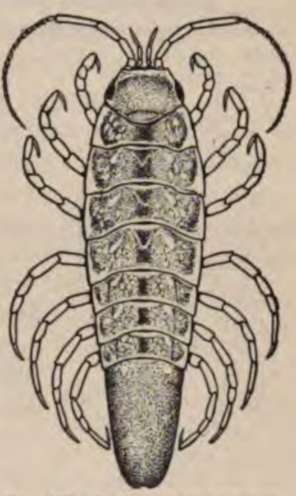

FIG. 427.—SYNIDOTEA HARFORDI (AFTER BENEDICT). × 3¼.

Localities.—Magdalena Bay, Lower California (Benedict); San Diego Bay, California.

Depth.—6¾ fathoms.

Body ovate, two and two-thirds times longer than wide, 6 mm.:16 mm. Length of abdomen 6 mm.

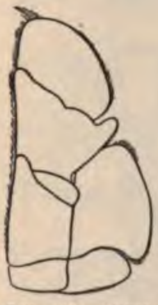

FIG. 428.—SYNIDOTEA HARFORDI. MAXILLIPED. × 27½.

Front of head without any emargination or median notch, frontal margin straight. Head slightly narrower at its anterior end than at its posterior end. Eyes large and round, composite in structure, and placed in the middle of the head at the extreme lateral margins. First pair of antennæ with the basal article short, not dilated; the second and third subequal, and each only a little longer than the first; the fourth article is twice as long as the third. The first pair of antennæ extend to the end of the third article of the peduncle of the second pair of antennæ. The basal article of the second antennæ is short; the second article is twice as long as the first; the third is a little longer than the second; the fourth is twice as long as the third; the fifth is one and a half times longer than the fourth. The flagellum consists of thirty-one articles. When retracted the second antennæ extend to the middle of the seventh thoracic segment. The maxilliped has a palp of three articles.

The first four segments of the thorax are longer than the last three. All the epimera of all the segments are firmly united with the segments. The lateral margins of the segments are straight.

The abdomen is composed of only one segment, with lateral sutu at the base, indicating another partly coalesced segment. The po rior portion of the abdomen is rounded with a median excavation or notch at the extremity.

The legs are more or less similar in structure.

SYNIDOTEA NODULOSA (Krøyer).

Idotea nodulosa Krøyer, Naturhistorisk Tidsskrift (2), II, 1846, p. 100; Voy. en Scand., Crust., 1849, pl. xxvi, fig. 2.—Reinhardt, Grönlands Krebsdyr, 1857, p. 34.—Lütken, Crust., Greenland, 1875, p. 150.

Synidotea nodulosa Harger, Am. Jour. Sci. (3), XV, 1878, p. 374; Proc. U. S. Nat. Mus., II, 1879, p. 160; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 351-352; pl. vi, figs. 33-35.—S. I. Smith, Report of Progress of the Geological Survey of Canada, 1880, p. 218.

Edotea nodulosa Miers, Journ. Linn. Soc. London, Zool., XVI, 1883, p. 67.—Hansen, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887-88, p. 188.

Synidotea nodulosa Benedict, Proc. Acad. Nat. Sci. Phila., 1897, pp. 398-399.—Richardson, American Naturalist, XXXIV, 1900, p. 228; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 541-542.—Ohlin, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. iv, 1901, No. 12, p. 29.

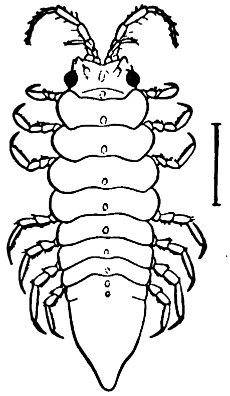

Fig. 429.—Synidotea nodulosa (after Harger). × 4.

Localities.—Southern Greenland; Middle Ground; latitude 66° 46′ north, longitude 54° 10′ west; Halifax; Georges Banks; Arctic Seas and southward on Pacific coast as far as British Columbia; Jugor Schar (Hansen); Recherche Bay, between Reindeer Point and Fox Glacier, West Spitzbergen (Ohlin).

Depth.—6 to 111 fathoms (Smith). In stones, sand, and algæ.

Ohlin[a] says of the color: "It is a uniform dark olive-green, sometimes on the epimeres with a trace of purplish spots."

Body oblong-ovate, a little over twice as long as wide, 3½ mm.: 7½ mm.

Head wider than long, 1½ mm.: 2½ mm., with the anterior margin slightly excavate. The eyes are small, round, composite, and situated close to the lateral margin. In front of each eye and arising from the anterior margin is a conspicuous tubercle. In the median line on the anterior part of the head are two low tubercles in longitudinal series, the second one being slightly larger than the first. On either side of this longitudinal row is a small low tubercle. Back of this arrangement of tubercles are two low elevations, one on either side of the median line. Posterior to these elevations is a low ridge. The first pair of antennæ have the first two articles short and subequal; the third is one and a half times longer than the second; the fourth is

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[a] Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. iv, 1901, No. 12, p. 29.

about twice as long as the second. The first antennæ extend to the end of the fourth article of the peduncle of the second pair of antennæ. The first two articles of the second pair of antennæ are short and subequal; the third and fourth are subequal, and each is about twice as long as either of the two preceding articles; the fifth is one and a half times longer than the fourth. The flagellum is composed of six articles. The second antennæ extend to the middle of the second thoracic segment. The maxillipeds have a palp of three articles.

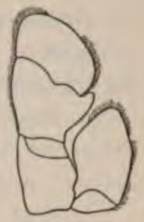
FIG. 430.—SYNIDOTEA NODULOSA. MAXILLIPED. × 33.

The second, third, and fourth segments of the thorax are subequal and each is a little longer than any of the others, which are nearly subequal, the seventh being a little shorter than the sixth. The epimera of all the segments are firmly and perfectly united with the segments. A faint longitudinal depression marks the place of coalescence on the last three segments. Each segment has on either side a short distance from the lateral margin a group of five or six low rugosities.

The abdomen is composed of a single segment with a suture line on either side at the base. It is 2½ mm. wide by 3 mm. in length and tapers to a pointed extremity.

All the legs are similar in structure.

SYNIDOTEA LÆVIS Benedict.

Synidotea lævis BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, pp. 399–400.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 849; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 269; American Naturalist, XXXIV, 1900, p. 228.

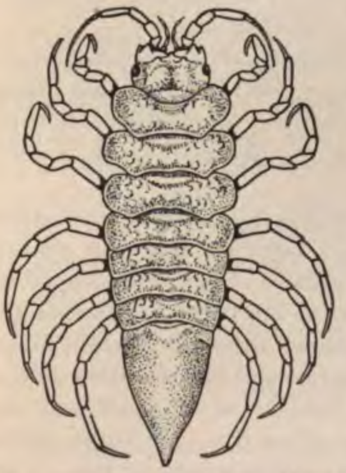
FIG. 431.—SYNIDOTEA LÆVIS (AFTER BENEDICT). × 4.

Localities.—Between Bristol Bay and Pribilof Islands, Alaska; Bering Sea.

Depth.—29½ to 36 fathoms. From sponges.

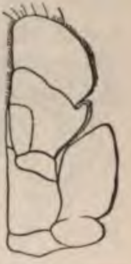
FIG. 432.—SYNIDOTEA LÆVIS. MAXILLIPED. × 27½.

Body narrow, elongate, a little over three times longer than broad, 4 mm.: 13 mm. Length of abdomen equal to a little more than one-third the length of entire body, 5 mm.: 13 mm.

Head excavate between the lateral angles, with another median excavation or notch. There is a very low tubercle just below the median notch. The eyes are large, round, and composite, and situated about the middle of the head at the extreme lateral margin. The first pair of antennæ have the basal article not enlarged; the second article is about equal in length to the first; the third and fourth are subequal, and each is a little longer than the second. The first antennæ extend to the middle of the third peduncular article of the second pair of antennæ. The basal article of the second antennæ is scarcely conspicuous from a dorsal view; the second, third, and fourth articles are about equal in length; the fifth is one and a half times longer than the fourth. The flagellum consists of ten articles. When retracted the second antennæ extend to the middle of the third thoracic segment. The maxillipeds have a palp of three articles.

The first four segments of the thorax are about equal in length, and each is longer than any of the last three. The epimera are all entirely coalesced with the segments. The lateral portions of all the segments are expanded in rounded processes.

The terminal segment of the body or abdomen is acutely pointed at the extremity. On either side at the base of the segment is a lateral suture indicative of another partly coalesced segment.

The legs are more or less similar in structure.

SYNIDOTEA MURICATA (Harford).

Idotea muricata HARFORD, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 117.

Synidotea muricata BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, p. 400.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 849; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 269; American Naturalist, XXXIV, 1900, p. 228.

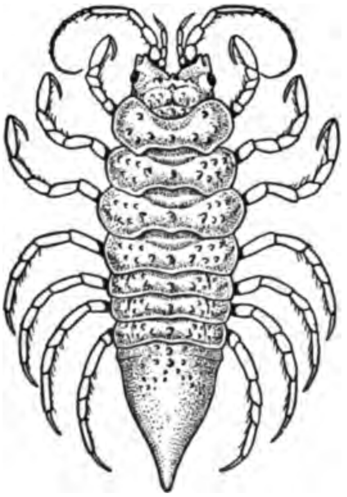

FIG. 433.—SYNIDOTEA MURICATA (AFTER BENEDICT). × 2½.

Locality.—Icy Cape, latitude 70° 15′ north, longitude 162° 55′ west; latitude 41° 3′ north, longitude 154° 15′ west.

Depth.—25 fathoms.

Body ovate, nearly three times longer than wide, 8 mm.: 22 mm. Length of abdomen a little more than one-third the length of the entire body, 8 mm.: 22 mm.

Head with a deep median excavation or notch. Between the eyes on the anterior portion of the head is a group of four small but very pronounced and clearly defined tubercles, two in longitudinal series and one on either side of these in transverse line half way between the other two. In front of the eyes and a little lateral to this group of tubercles are two very large tubercles, one on either side. Just back of the group of four tubercles are two groups of low tubercles, irregularly arranged in masses, one group placed on either side of the median line. Posterior to these masses of tubercles is a transverse row of three tubercles, the central one being in the median longitudinal line and larger than either one of the others. The eyes are large and round, composite in structure, and situated about the middle of the head, a little distance from the lateral margins. The basal article of the first pair of antennæ is somewhat enlarged and almost twice as wide as the second article, which it equals in length; the third and fourth articles are subequal and each is about twice as long as the second article. The first antennæ extend to the end of the fourth peduncular article of the second antennæ. The basal article of the second pair of antennæ is inconspicuous from a dorsal view; the second, third, and fourth articles are successively a little longer than the preceding article; the fifth is about twice as long as the fourth. The flagellum consists of thirteen articles. When retracted, the second antennæ extend to the posterior margin of the third thoracic segment. The maxilliped has a palp of three articles.

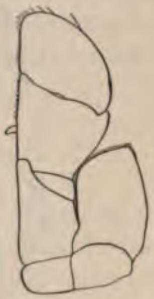
FIG. 434.—SYNIDOTEA MURICATA. MAXILLIPED. × 20¼.

The four anterior segments of the thorax are longer than the last three. All the epimera are firmly united with the segments. In the median longitudinal line is a row of large tubercles, one for each segment, triangular in shape with acutely pointed extremities. On either side of the median row of tubercles is a group of six or more tubercles, of which the innermost one is larger and more conspicuous than any of the others in the group, so that a longitudinal series is formed of these larger tubercles, one on each segment, and placed one row on either side of the median row of tubercles. The sides of the segments are expanded with lateral margins rounded.

The abdomen consists of one segment with lateral sutures at the base indicating another partly coalesced segment. At the base of the segment in longitudinal series in line with the median row of tubercles on the thorax are two tubercles. There are about six small tubercles irregularly arranged on either side of the median line on the anterior portion of the abdomen. The terminal segment of the body is pointed at the extremity, the posterior half narrowing rapidly to an acute tip.

The legs are more or less similar in structure.

SYNIDOTEA PICTA Benedict.

Synidotea picta BENEDICT, Proc. Acad. Nat. Sci. Phila., 1897, pp. 401–402.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 849; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 269; American Naturalist, XXXIV, 1900, p. 228.

Localities.—Alaska and Bering Straits.

Depth.—5 to 20 fathoms in sand and rocks.

Body ovate, two and two-thirds times longer than broad, 6 mm.: 16 mm. Length of abdomen three-eighths the length of entire body, 6 mm.: 16 mm.

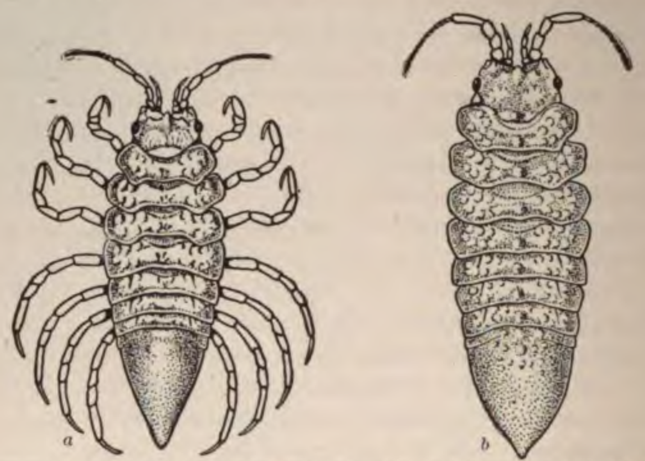

FIG. 435.—SYNIDOTEA PICTA (AFTER BENEDICT). × 3. *a*, TYPICAL FORM. *b*, VARIETY.

Head with deep median excavation or notch in front. In the median line, just below the frontal notch is a large and prominent tubercle, narrow and elongate. On either side in line with this tubercle is a small rounded tubercle. These three tubercles are placed in a transverse line between the eyes. A little in front of these tubercles, and halfway between the median notch and the lateral margins are two tubercles, one on either side in front of the eye. Back of the three tubercles in tranverse series are two rugosities, one on either side of the median line, and posterior to these is a low ridge produced in a median tubercle. The eyes are large and round, compound in structure, placed about the middle of the head and a short distance from the lateral margin. The first antennæ have the basal article short and not expanded; the second and third articles are about equal in length; the fourth is a little longer than the third. The first antennæ extend to the end of the third peduncular article of the second pair of antennæ. The basal article of the second antennæ is inconspicuous from a dorsal view; the second, third, fourth, and fifth are each successively a little longer than the preceding article. The flagellum consists of ten articles. When retracted the second antennæ extend to the middle of the third thoracic segment. The maxillipeds have a palp of three articles.

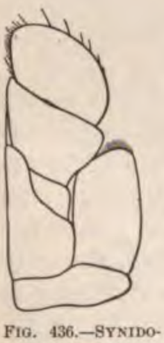

FIG. 436.—SYNIDOTEA PICTA. MAXILLIPED. × 27½.

The first four segments of the thorax are longer than the last three. In all the epimera are firmly united with the segments. Along the median longitudinal line of the thorax is a row of low tubercles, one for each segment, which increase in size toward the posterior end of the series. On either side of this median tubercle is a group of low tubercles on each segment of the thorax, with six or more tubercles in each group.

The abdomen is composed of a single segment, with lateral sutures indicative of another coalesced segment. At the base of the segment, in line with the median row of tubercles on the thorax, are two tubercles in longitudinal series. On either side of this series are low rugosities. The abdomen is acutely pointed at the extremity, becoming more rapidly narrow from the middle of the segment.

The legs are more or less similar in structure.

62. Genus COLIDOTEA Richardson.

Flagellum of second pair of antennæ multi-articulate. Epimera of the four anterior thoracic segments coalesced and firmly united with the segments, there being no indication of a separation. Epimera of last three segments of thorax distinctly separated from the segments. Abdomen consisting of a single segment, with a suture line on either side at the base indicating another partly coalesced segment. Maxillipeds with the palp composed of four[a] articles.

COLIDOTEA ROSTRATA (Benedict).

Idotea rostrata Benedict, Proc. Biol. Soc. Washington, XII, 1898, pp. 53–54.

Colidotea rostrata Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 849; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 270; American Naturalist, XXXIV, 1900, p. 228.

Locality.—San Pedro, California.

Body oblong-ovate, about two and a half times longer than wide, 5 mm. : 12 mm.

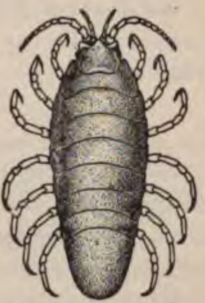

Fig. 437.—Colidotea rostrata (after Benedict). × 3.

Head wider than long, 2½ mm. : 3 mm., with the anterior margin produced in the middle in a short rostrum, rounded at the apex. The antero-lateral angles are prominent, rounded, and extend anteriorly as far as the rostrum. The eyes are small, rounded, and composite; they are situated at the sides of the head. The first pair of antennæ have the basal article somewhat enlarged; the three following articles are short and nearly subequal, the terminal one being a little longer. The first pair of antennæ extend to the end of the second article of peduncle of the second pair of antennæ. The second antennæ have

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[a] In the Proc. U. S. Nat. Mus., XXI, 1899, p. 843 (key) and p. 849, fig. 22, the maxilliped is described and figured as composed of two articles. The maxilliped appears two-jointed from the inner side, and the figure and the examination was made from that side. In reexamining the material for the present paper, the mistake was noticed and the correction is herein made.

the first article almost inconspicuous from a dorsal view; the second article is large; the third is shorter than the second; the fourth and fifth are subequal and each is one and a half times longer than the third. The flagellum is composed of six and seven articles in one specimen; of four and five in the other. The palp of the maxilliped is composed of two articles. When retracted the second antennæ extend to the posterior margin of the second thoracic segment.

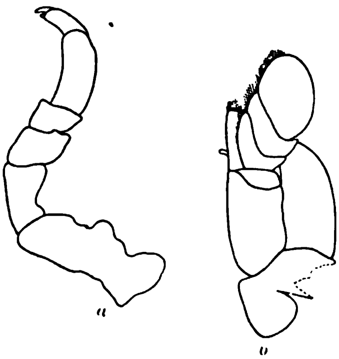

FIG. 438.—COLIDOTEA ROSTRATA. a, LEG OF SECOND PAIR. × 15½. b, MAXILLIPED. × 27½.

The first segment of the thorax has the antero-lateral angles produced to surround the posterior half of the head. The second segment is a little longer than the first; the third, fourth, and fifth segments are the longest; the sixth is about equal in length to the second; the seventh is as long as the first. There is no indication of epimera on any of the first four segments. The epimera of the fifth segment are narrow, almost inconspicuous plates, placed about the middle of the lateral margin. The epimera of the sixth and seventh segments are wide plates occupying the posterior half of the lateral margin.

The abdomen is composed of a single segment with a suture line on either side at the base. Its posterior margin is rounded.

All the legs, with the exception of the first pair, have a small rounded carina on the basis at the proximal extremity. On the four posterior pairs of legs this carina becomes more triangular in shape.

63. Genus EDOTEA Guérin-Méneville.

Flagellum of second antennæ rudimentary. Maxillipeds have a palp composed of three articles. Epimera of all the segments of the thorax firmly and perfectly united with the segments. Abdomen composed of a single segment, with lateral incisions or suture lines at the base, indicating another partly coalesced segment. All the legs prehensile.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS EDOTEA.

a. Antero-lateral angles of head produced into horn-like projections. Lateral margins of thoracic segments produced into horn-like projections. Four tubercles situated on the dorsal surface of head................*Edotea acuta* Richardson

a′. Antero-lateral angles of head not produced into horn-like projections but rounded. Lateral margins of thoracic segments not produced into horn-like projections. Two tubercles situated on the dorsal surface of head just back of the anterior margin.

  b. Lateral margins of thorax nearly straight. Lateral incisions at base of terminal segment of body slight. Second pair of antennæ extend to the middle of the fourth article of the antennæ of the first pair; second article half as long as first; third twice as long as second; fourth a little longer than third; the fifth is half the length of the fourth. Two longitudinal lateral rows of low tubercles extend the entire length of the thorax, one row on either side along the lateral portions of the segments.......*Edotea triloba* (Say)

b'. Lateral margins of thorax rounded. Lateral incisions at base of terminal segment of body deep. Second pair of antennæ do not quite extend to the end of the third article of the first pair of antennæ; first, second, and third articles subequal; fourth article a little longer than third; fifth article half the length of the fourth. There are no tubercles on the lateral portions of the segments of the thorax.......*Edotea montosa* (Stimpson)

EDOTEA ACUTA Richardson.

Edotea acuta Richardson, American Naturalist, XXXIV, 1900, p. 228; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 544–545.

Depth.—105 fathoms.

Head with the antero-lateral angles produced in knob-like projections. Four tubercles situated on the surface of the head, two on the anterior part and two on the posterior part. First pair of antennæ twice as long as the lateral projections. Second pair not reaching beyond the lateral projections, and carrying a rudimentary flagellum composed of one article.

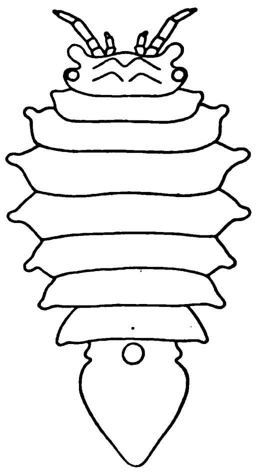

Fig. 439.—Edotea acuta.

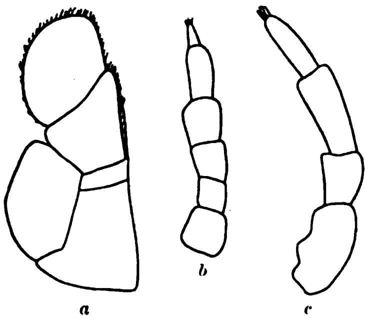

Fig. 440.—Edotea acuta. *a*, Maxilliped. × 51⅓. *b*, Second antenna. × 51⅓. *c*, First antenna. × 51⅓.

Thoracic segments subequal. Sides of all the segments produced into knob-like projections.

Terminal abdominal segment with a transverse depression or groove on either side of which the lateral margin is indented. Apex of segment produced as in *Edotea montosa.*

Color white.

Three specimens were found in the stomach of a cod, taken by the U. S. Bureau of Fisheries steamer *Albatross* while cruising in the Atlantic Ocean from Woods Hole, Massachusetts, to Nova Scotia.

Depth.—105 fathoms.

Type.—Cat. No. 23909, U.S.N.M.

EDOTEA TRILOBA (Say).

Idotea triloba Say, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 425.—Milne Edwards, Hist. Nat. Crust., III, 1840, p. 134.

Jæra triloba White, List Crust. Brit. Mus., 1847, p. 97.

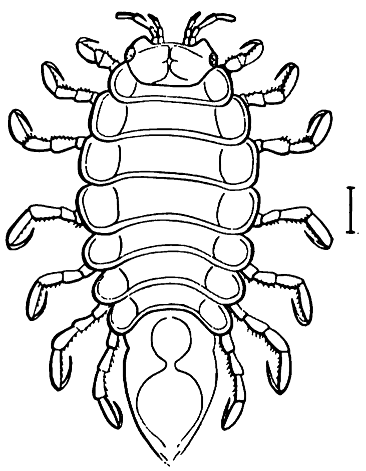

Fig. 441.—Edotea triloba (after Harger). × 10.

Epelys trilobus Harger with Verrill, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 571 (277), pl. vi, fig. 28; p. 370 (76).—Verrill, Am. Jour. Sci., VII, 1874, p. 135; Proc. Amer. Assoc., 1874, p. 372.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 160; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 358–359, pl. vii, figs. 42–43.

Edotea triloba Miers, Jour. Linn. Soc. London, XVI, 1883, pp. 70–71.—Richardson, American Naturalist, XXXIV, 1900, p. 228; Proc. U. S. Nat. Mus., XXIII, 1901, p. 545.—Paulmier, Bull. New York State Museum, 1905, p. 177.

Localities.—Egg Harbor, New Jersey; eastern shore of Staten Island; Savin Rock, near New Haven, Connecticut; Noank Harbor, Connecticut; Vineyard Sound, Provincetown, Massachusetts; near Cape Cod; Gloucester; 30 miles northeast of Portland, Quohog Bay, Casco Bay, Maine.

Depth.—Surface to ½ fathom, in low, muddy water; in eelgrass.

Body ovate, a little more than twice as long as wide, 3 mm. : 7 mm. Length of abdomen equal to 3 mm.

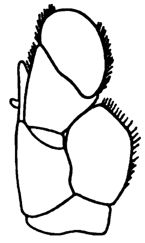

Fig. 442.—Edotea triloba. Maxilliped. × 51⅓.

Head produced in the middle of the front, with two conspicuous tubercles, one on either side of the median line and close together, situated on the anterior margin. Antero-lateral angles of the head prominent and produced in rounded lobes, upon which the eyes are placed. The first pair of antennæ have the first and second articles equal in length; the third article is twice as long as the second; the fourth article is about two-thirds the length of the third. The first pair of antennæ are longer than the second pair, the second antennæ reaching only to the middle of the fourth article of the first pair of antennæ. The first, second, and third articles are short and subequal; the fourth is one and a half times longer than the third; the fifth is just a little longer than the fourth. The flagellum is minute, composed of one article, which is one-third the length of the fifth article. When retracted the first antennæ extend only to the middle of the lateral margin of the first thoracic segment. The maxilliped has a palp of three articles.

The third and fourth segments of the thorax are longer than any of the others and are also the widest. The epimera of all the segments are united with the segments. The lateral portions of the segments are laterally expanded, the lateral margins being almost straight. Two longitudinal rows of low tubercles are placed one on either side along the lateral portions of the segments, each segment having two tubercles, one on either side.

All the legs are prehensile; the first are much shorter than any of the others.

The abdomen is composed of one segment with suture lines at the base indicating another partly coalesced segment as well as slight incisions in the lateral margins. A large, rounded prominence is situated in the median line at the base of the abdomen. This prominence is followed by a depression, so that in a lateral view the abdomen is seen to be in the form of two elevations with a deep depression separating them. The extremity is also separated off from the second elevation by another depression. The sides of the abdomen converge rapidly from a point a little below the middle to a narrow and pointed extremity.

EDOTEA MONTOSA (Stimpson).

Idotea montosa Stimpson, Smithsonian Contributions to Knowledge, VI, 1853, p. 40.

Epelys montosus Harger with Verrill, Report U. S. Commissioner of Fish and Fisheries, Pt. 1, 1873, p. 571 (277); p. 370 (76).—Verrill, Am. Jour. Sci., VII, 1874, p. 45; Proc. Amer. Assoc., 1874, p. 367.—Smith and Harger, Trans. Conn. Acad. Sci., III, 1874, p. 3.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 161; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 359–360, pl. VIII, figs. 44–47.

Edotea montosa Miers, Jour. Linn. Soc. London, XVI, 1883, p. 72.—Richardson, American Naturalist, XXXIV, 1900, p. 228; Proc. U. S. Nat. Mus., XXIII, 1901, p. 545.

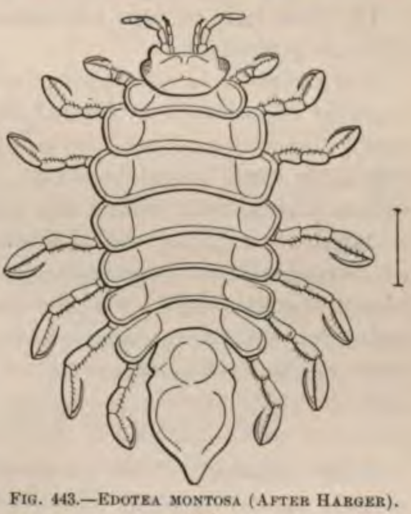

Fig. 443.—Edotea montosa (after Harger). × 6.

Localities.—Block Island Sound; Long Island Sound; Vineyard Sound; Eastport, Maine; Georges Bank; Stellwagens Bank; Casco Bay; Bay of Fundy; Halifax, Nova Scotia; Grand Menan.

Depth.—8 to 25 fathoms, in mud and fine sand.

Body ovate, a little more than twice as long as wide, 4 mm. : 9 mm.

Length of abdomen equal to one-third the length of the entire body, 3 mm.: 9 mm.

Head with the front triangularly produced and with two low tubercles situated on the anterior margin, one on either side of the median line. Eyes situated on the antero-lateral lobes, which are rounded. The first pair of antennæ have the first and second articles equal in length; the third is twice as long as the second; the fourth is but little longer than half the length of the third. The first pair of antennæ is longer than the second, the second pair not quite extending to the end of the third article of the first pair of antennæ. The second antennæ have the first, second, and third articles subequal; the fourth is a little longer than the third; the fifth is one and a half times as long as the fourth. The flagellum consists of one article one-half as long as the fourth peduncular article. When retracted, the first pair of antennæ extend to the middle of the lateral margin of the first thoracic segment. The maxilliped has a palp of three articles.

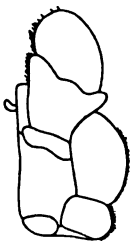

Fig. 444.—Edotea montosa. Maxilliped. × 38¼.

The third and fourth segments of the thorax are the widest and longest. The epimera are firmly united with the segments in all the segments. There is a slight linear depression on either side of each segment, probably indicating the place where the coalescence has taken place. The lateral margins of all the segments are rounded.

The first pair of legs are much shorter than the other six pairs. Alls are prehensile.

The abdomen is composed of a single segment. Another coalesced segment is indicated by lateral incisions at the base of the abdomen, and a slight depression extending a short distance inward on either side from these lateral incisions. A depression in the dorsal surface occurs just a little below the place where the lateral incisions are situated, thus giving the abdomen the appearance, in a lateral view, of two elevations separated by a depression. Another depression near the extremity of the abdomen separates off the small terminal point from the large median elevation. The sides of the abdomen converge to a triangulate extremity.

64. Genus EUSYMMERUS Richardson.

Body elliptical. Palp of maxillipeds composed of four articles. Second pair of antennæ with joints of flagellum all consolidated and forming a single piece. Eyes dorsally situated.

Lateral margins of thoracic segments expanded, edges straight and full. Epimera of second, third, fourth, and fifth segments coalesced and firmly united with the segments; those of the sixth and seventh segments distinct and visible.

Abdomen composed of one segment with suture lines indicative of another partly coalesced segment.

EUSYMMERUS ANTENNATUS Richardson.

Eusymmerus antennatus RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 852–853; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 273–274.

Locality.—Abreojos Point, Lower California.

Depth.—5½ fathoms.

Body elliptical, tapering toward the extremity; surface smooth.

Head three times broader than long, with the antero-lateral angles prominent. Anterior margin excavate. Lateral margins expanded. Eyes situated dorsally on the extreme lateral margin in the median transverse line. First pair of antennæ composed of four articles, short, extending only a little beyond the second joint of the second pair of antennæ. Second pair of antennæ consist of six articles, and are geniculate, the last or flagellar joint being somewhat clavate.

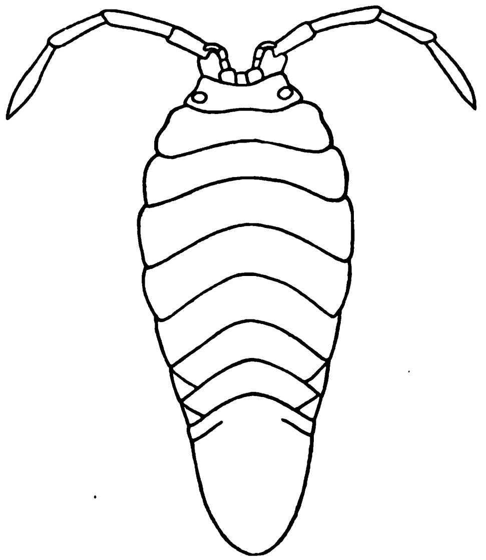

FIG. 445.—EUSYMMERUS ANTENNATUS. × 8.

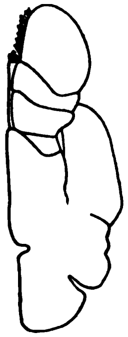

FIG. 446.—EUSYMMERUS ANTENNATUS. MAXILLIPED. × 27½.

Thoracic segments with the lateral margins expanded. Lateral edges straight, full. Epimera of second, third, fourth, and fifth segments coalesced and firmly united with the segments; epimera of sixth and seventh segments distinct and articulating with segments.

Abdomen composed of only one segment with suture lines indicative of another partly coalesced segment. It is posteriorly rounded, and tapers from the base to the extremity.

Legs slender, with dactyli bi-unguiculate.

Color of specimen brown. Lateral edges of thoracic segments colorless.

One specimen from off Abreojos Point, Lower California, station 2835, was collected by the U. S. Bureau of Fisheries steamer *Albatross;* depth, 5½ fathoms.

Type.—Cat. No. 22580, U.S.N.M.

65. Genus ERICHSONELLA[a] Benedict.

Flagellum of second antennæ consisting of a single clavate article. The maxillipeds have a palp composed of four articles The epimera of all the segments of the thorax, including the first, are distinctly separated from the segments. The abdomen is composed of a single segment.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ERICHSONELLA.

a. Surface of body smooth throughout. Outline of body regular. First pair of antennæ short. Terminal segment of body shows but slight traces of a lateral tooth near its base on either side................ *Erichsonella attenuata* (Harger)

a′. Surface of body tuberculated. Outline of body serrate. First pair of antennæ long. Terminal segment of body with a prominent lateral tooth near the base on either side.

- *b.* Large bifid tubercle on center of head. Median longitudinal row of tubercles on each thoracic segment........................ *Erichsonella filiformis* (Say)
- *b′.* Large tridentate spine on center of head. Median longitudinal row of tubercles on each thoracic segment, and a longitudinal row of tubercles on either side of median row on first four thoracic segments. *Erichsonella floridana* Benedict

ERICHSONELLA ATTENUATA (Harger).

Erichsonia attenuata HARGER with VERRILL, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 570 (276), pl. VI, fig. 27; p. 370(76).—HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 160; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 356–357, pls. VI, VII, figs. 36–37.

Erichsonella attenuata RICHARDSON, American Naturalist, XXXIV, 1900, p. 228; Proc. U. S. Nat. Mus., XXIII, 1901, p. 543.

Localities.—Great Egg Harbor, New Jersey; Noank, Connecticut.

Body narrow, elongate, six times longer than wide, 2 mm. : 12 mm. Head wider than long, 1½ mm. : 2 mm., with the anterior margin slightly excavate between the antero-lateral angles. Eyes small, composite, and situated at the sides of the head, halfway between the anterior and posterior margins. There is a prominent elevation situated on the head between the eyes. The first pair of antennæ have the basal article large and somewhat dilated; the second article is a little shorter than the first, and about half as wide; the third and fourth articles are equal in length, and each is one and a half times longer than the second. The first pair of antennæ extend to the middle of the third article of the peduncle of the second pair of antennæ. The first article of the second antennæ is short and inconspicuous in a dorsal view; the second article is long, about three times longer than the first; the third is about one and a half times longer than the second; the fourth is about one and a half times longer than the third; the fifth is a little shorter than the fourth. The flagellar article is a little longer than the fourth peduncular article. The second antennæ are 7½ mm. long, or longer than half the entire length of the body. The palp of the maxillipeds is composed of four articles.

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[a] Proposed by Dr. James E. Benedict for the preoccupied *Erichsonia.*

The first segment of the thorax is a little shorter than any of the others except the seventh, both of which are 1 mm. long. The second, third, fourth, and fifth segments are subequal and each is about 1½ mm. in length. The sixth segment is about 1¼ mm. long. The epimera are distinctly separated on all the segments, including the first. They are very small, almost inconspicuous, placed in the first three segments on the lateral margin anterior to the median transverse line. In the fourth segment they occupy the middle of the lateral margin. In the last four segments they are placed below the median transverse line. They give the segments a rather angular appearance.

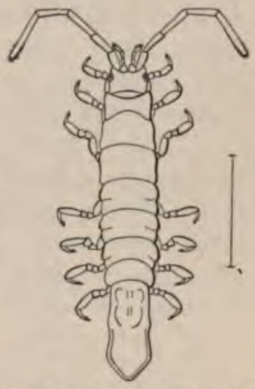
FIG. 448.—ERICHSONELLA ATTENUATA (AFTER HARGER). × 3.

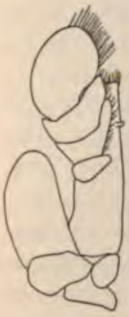
FIG. 447.—ERICHSONELLA ATTENUATA. MAXILLIPED. × 20¼.

The abdomen is composed of a single segment. About one-third the distance from the base to the posterior extremity is a small lateral process on either side. Below these processes the sides of the abdomen are nearly parallel to a point about ½ mm. from the extremity, where they converge to a rounded apex.

The legs are all ambulatory with bi-unguiculate dactyli.

ERICHSONELLA FILIFORMIS (Say).

Stenosoma filiformis SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 424.—MILNE EDWARDS, Hist. Nat. Crust., III, 1840, p. 134.

Idotea filiformis WHITE, Hist. Crust. Brit. Museum, 1847, p. 95.

Erichsonia filiformis HARGER with VERRILL, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 570 (276); p. 316 (22).—HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 160; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 355–356, pl. VII, figs. 38–41.

Erichsonella filiformis RICHARDSON, American Naturalist, XXXIV, 1900, p. 22 Proc. U. S. Nat. Mus., XXIII, 1901, p. 543.

Localities.—Great Egg Harbor, New Jersey; Long Island Sound; Vineyard Sound, Massachusetts; Puntarasa, Florida; Nantucket Sound; Thimble Islands; Fisher's Island Sound; Noank, Connecticut; the Bahamas.

Depth.—4½ to 18 fathoms, in sand and gravel, algæ, etc.; low water.

Body oblong-ovate, nearly three times as long as wide, 3 mm. : 8 mm. Length of abdomen equal to a little more than one-third the length of the entire body, being 3 mm. long.

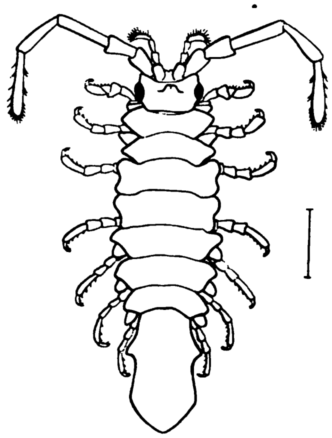

FIG. 449.—ERICHSONELLA FILIFORMIS (AFTER HARGER). × 5.

Head with front deeply excavate between the antero-lateral angles. Antero-lateral angles prominent and acute. Eyes large, round, composite, and situated about the middle of the head at the extreme lateral margins. On the dorsal surface of the head, extending from the anterior to the posterior margins, is a prominent elevation bearing two tubercles, one on either side of the median line, which, in a dorsal view, seem to project forward beyond the frontal emargination. The first pair of antennæ have the basal article large and somewhat dilated; the second and third articles are subequal, and only a little shorter than the first; the fourth article is a little longer than the third. The first antennæ extend to the end of the second article of the second antennæ. The basal article of the second pair of antennæ is short; the second is long, equal to the third article in length, and also equal to the first two articles of the first pair of antennæ; the fourth article is nearly twice as long as the third; the fifth is shorter than the fourth, being only about one and a half times longer than the third; the sixth or flagellar article is about as long as the fourth. When retracted, the second pair of antennæ extend to the posterior margin of the fifth thoracic segment. The maxilliped has a palp of four articles.

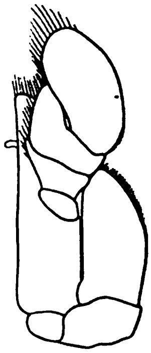

FIG. 450.—ERICHSONELLA FILIFORMIS. MAXILLIPED. × 51½.

The second, third, and fourth segments of the thorax are a little longer than any of the others, which are subequal. In the first two segments the lateral parts are produced in very acute processes, one process on either side of each segment. Just anterior to this process is the epimeron, which is also acutely produced, but lies underneath the lateral portion of the segment in a lower plane. The epimeron of the second segment is bilobate, the upper division, in a dorsal view, concealing the lower lobe, which is also very acute. The lateral parts of the third and fourth segments are produced on each side into two acute processes—a larger anterior process and a smaller posterior process. The epimera of these segments are inconspicuous, as they are small and acute, and lie just underneath the lateral parts about the middle of the segment. In the last three segments the anterior part of the segment is acutely produced, and the acute epimeron occupies the remainder of the lateral margin, the posterior half of the lateral part of the segment not being produced. On each of the first four segments of the thorax is a small tubercle near the posterior margin in the median line.

The abdomen is composed of one segment only. About one-third the distance from the base to the extremity, on either side the lateral margin is produced in an acute angular process. About two-thirds the distance from the base to the extremity the sides are angulate. From this point the lateral margins converge rapidly to a triangulate extremity, posteriorly rounded.

The legs are all more or less alike in structure.

ERICHSONELLA FLORIDANA Benedict.[a]

Erichsonella floridana BENEDICT, in RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 543-544.

Locality.—Key West, Florida, among algæ below low tide.

The body is long and narrow, broadest at the third and fourth segments. The head is wider than long. A rectangular projection extends forward in front of the eyes. The frontal margin between the projections is arcuate. The eyes are lateral, slightly projecting. The antennæ are geniculate. The three distal segments are approximately the same length. The terminal segment or flagellum is hairy.

A large tridentate spine occupies the center of the head. The main portion of the spine has a longitudinally compressed apex, the lateral portions arise at a distance from the base and point divergently forward, falling short of the elevation of the main portion.

The third and fourth segments of the thorax are the longest and widest; the posterior segments are successively shorter. The lateral margins of the segments are concave, making the segmental angles acute. The epimera are exposed in the concave margins. On the posterior margin of each segment at the median line is a single spine pointing backward. On t

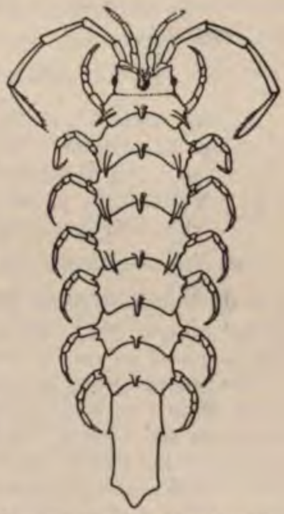
FIG. 451.—ERICHSONELLA FLORIDANA (AFTER BENEDICT).

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[a] The description that follows is from Doctor Benedict's manuscript.

first four segments there are single lateral spines on the transverse median line similar in size, shape, and direction to those of the dorsal line.

The pleon consists of a single elongated segment with subparallel sides ending in a blunt apex. On each side of the pleon are two widely separated angular projections.

Type.—Cat. No. 15786, U.S.N.M.

66. Genus CLEANTIS Dana.[a]

Flagellum of second antennæ consolidated to form a single article or formed of only a restricted number of joints. Epimera of all the segments of the thorax with the exception of the first distinctly separated from the segments. Abdomen composed of more than one segment, distinct and visible in a dorsal view.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CLEANTIS.

a. Abdomen composed of four distinct segments, three short ones anterior to the terminal segment.
  b. Maxillipeds with a palp composed of five articles. Posterior portion of abdomen obliquely truncated, the oblique terminus having a raised margin anteriorly. *Cleantis planicauda* Benedict
  b'. Maxillipeds with a palp composed of four articles. Posterior portion of abdomen flat, in a lower plane than the anterior portion and having a median groove extending forward some distance into the anterior portion. *Cleantis occidentalis* Richardson
a'. Abdomen composed of three segments, two short ones anterior to the terminal segment .... *Cleantis heathii* Richardson

CLEANTIS PLANICAUDA Benedict.[b]

Cleantis planicauda BENEDICT in RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 851 (footnote); Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 271–273 (footnote); American Naturalist, XXXIV, 1900, p. 229; Proc. U. S. Nat. Mus., XXIII, 1901, p. 544.—MOORE, Bull. U. S. Commissioner of Fish and Fisheries, XX, Pt. 2, 1902, p. 174, pl. XI, figs. 1–6.

Localities.—Pensacola, Florida; Arroyo, Porto Rico.

Body linear, densely granulated, five times longer than broad. Feet folded beneath out of view from above. Body lined longitudinally by six more or less broken black lines. The lines on the sides are more distinct than those above.

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[a] The type species of the genus, *Cleantis linearis* Dana, has the abdomen composed of four distinct segments, three short ones anterior to the terminal segment. *Cleantis planicauda* and *Cleantis occidentalis* agree in this respect with the type. *Cleantis heathii* may have to be removed to another genus, but as only a single specimen exists of this species, I prefer to let it remain, for the present, where it was originally placed. The maxillipeds have five joints to the palp in *C. planicauda* and four articles in *C. occidentalis*. In order to be consistent, they should also be separated into different genera, but inasmuch as I have not examined the type species of the genus it is not possible to tell which one agrees with the type in this respect, or in fact if either do. Therefore I have decided for the present to keep both species in the genus as defined by Dana.

[b] The description that follows is from Doctor Benedict's manuscript.

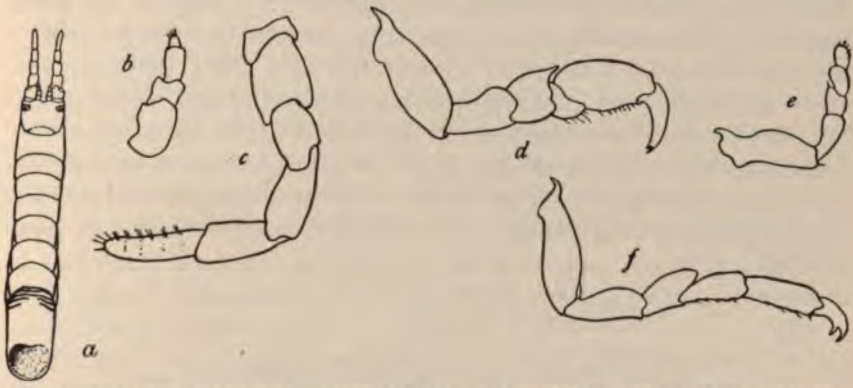

FIG. 452.—CLEANTIS PLANICAUDA (AFTER MOORE). *a*, GENERAL FIGURE. *b*, FIRST ANTENNA. *c*, SECOND ANTENNA. *d*, FIRST LEG. *e*, FOURTH LEG. *f*, SEVENTH LEG.

Head subquadrate, partially immersed in the first thoracic segment and rounded on the posterior margin; sides parallel, anterior margin emarginate; a deep depression or groove runs from the median notch to the center of the head. The eyes are situated near the antero-lateral angle; post-occipital lobe distinct; antennæ with six segments; first very short and nearly immobile; second very short and stout; the third segment is equal in length to the second, but not so stout; the fourth and fifth are of equal length and about one-third longer than the second and third segments. The terminal segment or flagellum is lighter in color, and is armed with short bristles. The length of the antennæ is equal to the length of the head and first two thoracic segments. The antennulæ extend to the middle of the third segment of the antennæ. The first segment is quadrate; the second subquadrate; the third is pear-shaped; the fourth segment is very small. Maxillipeds with the palp composed of five articles.

The segments of the thorax are nearly equal in length and breadth, the third and fourth being but little longer than the others. The epimera of the second, third, and fourth segments are very small and can not be seen from above. On the fifth, sixth, and seventh segments the epimera are large and project well behind the margin of the segment in the form of an acute angle.

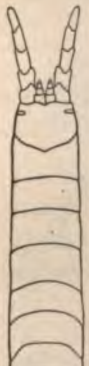

FIG. 453.—CLEANTIS PLANICAUDA.

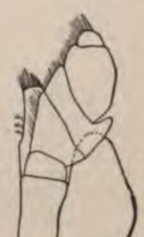

FIG. 454.—CLEANTIS PLANICAUDA. MAXILLIPED, × 20½.

The pleon is composed of four segments; the first three are ver narrow; the terminal segment is elongated with subparallel sides.

marked character of the pleon is its obliquely truncated extremity. The oblique terminus is perfectly flat, with a raised margin.

The feet of this species, as in the typical species described by Dana, are in two series. The first is composed of the first three pairs of feet, which are comparatively stout and increase in length to the third segment. The second series begins on the fourth segment with a pair of short feet, which fold transversely, the other pairs are successively longer and fold backward. The feet of the second series are much more slender than those of the first. The dactyli of all are bi-unguiculate. The carpal and propodal joints are spinulose beneath.

The operculum is not traversed by an oblique line. The sides of the basal segment are subparallel. The terminal segment is about as broad as long.

Length, 15 mm.; width, 3 mm.

Type.—Cat. No., 22579, U.S.N.M.

CLEANTIS OCCIDENTALIS Richardson.[a]

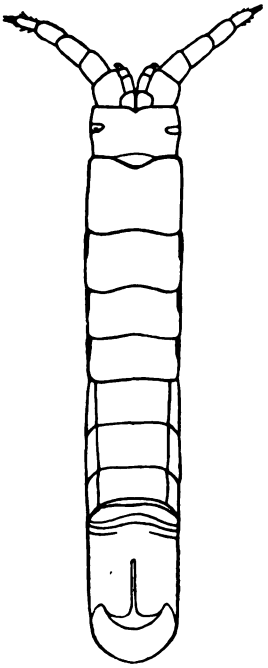

FIG. 455.—CLEANTIS OCCIDENTALIS. × 10.

Cleantis occidentalis RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 850–851; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 270–272.

Locality.—Magdalena Bay, Lower California.

Depth.—12 fathoms.

Body narrow, elongate; surface smooth.

Head of same width as thoracic segments, and with a small, median anterior depression. Eyes lateral. First pair of antennæ consisting of four joints, reach the middle of the third joint of the second pair of antennæ. Second pair of antennæ consist of six joints (five seen from a dorsal view), the last joint being the flagellum. Maxillipeds with the palp composed of four articles.[b]

The thoracic segments show a gradual, though marked, decrease in length, the first one being the longest and somewhat excavate on its anterior margin. The epimera of the second, third, and fourth segments are short and narrow, reaching but half the

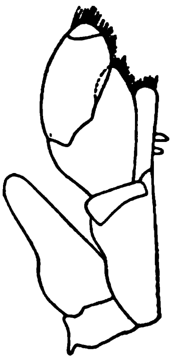

FIG. 456.—CLEANTIS OCCIDENTALIS. MAXILLIPED. × 39.

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[a] The type of this species unfortunately has been lost.

[b] The palp of the maxillipeds was heretofore wrongly represented as composed of only two articles.

length of the segments, while those of the last three segments are broad, with their posterior angles produced beyond the segments.

The abdomen is composed of four segments, three short ones and the terminal segment, which bears suture lines indicative of another coalesced segment. The terminal segment is rounded posteriorly. The anterior three-fourths of the segment is raised considerably above the posterior fourth, which is flat, and there is a groove in the median line on the posterior third of the anterior part of the segment.

The legs are similar to those of the type species of the genus. The three anterior pairs increase in length, the third pair being the longest, and all are directed anteriorly. The fourth pair are very short and fold across the body. The last three pairs increase in length, the seventh pair being the longest, and all these are directed posteriorly. The legs are compact and lie folded on the ventral side and can not be seen from a dorsal view.

There is but one specimen collected by the U. S. Bureau of Fisheries steamer *Albatross* in 1888 at Magdalena Bay, Lower California; depth 12 fathoms.

Type.—Cat. No., 22578, U.S.N.M.

CLEANTIS HEATHII Richardson.

Cleantis heathii Richardson, Proc. U. S. Nat. Mus., XXI, 1899, pp. 851-852; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 272; American Naturalist, XXXIV, 1900, p. 229.

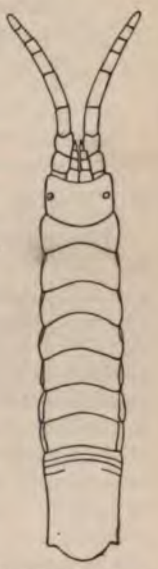

Fig. 458.—Cleantis heathii. × 6⅔.

Locality.—Monterey Bay, Lower California.

Body slender, elongate; surface smooth.

Head with lateral margins straight; anterior margin slightly excavate. Eyes small, lateral. First pair of antennæ consist of four joints and are a little longer than half the width of the head. The second pair of antennæ are half as long as the body and are composed of nine joints, the three terminal ones forming the flagellum, which can not be distinguished from the peduncle. Palp of the maxillipeds composed of four articles.

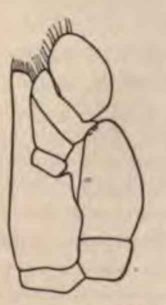

Fig. 457.—Cleantis heathii. Maxilliped. × 77¼.

Thoracic segments subequal, with narrow epimera, those of the second, third, and fourth segments reaching but half the length of the segments, the last three epimera extending the entire length of the lateral margin.

The abdomen is composed of three segments, with suture lines indicative of another. The terminal segment is broadly rounded posteriorly with small but acute lateral angles. The sides are almost parallel.

The first four pairs of legs are directed anteriorly; the last t extend in a posterior direction. There is no perceptible inequality in length. The unguli are bifid.

Two specimens were sent by Mr. Heath from Monterey Bay, California.

Type.—Cat. No. 22577, U.S.N.M.

IV. ASELLOIDEA or ASELLOTA.[a]

Legs of the first pair not cheliform. Uropoda terminal, biramous. Pleopoda exclusively branchial, the first pair in the female generally transformed into a single operculum covering the succeeding pairs. Epimera very small or obsolete. All the segments of the abdomen fused together, although occasionally one or two short segments are partially visible anterior to the terminal segment.

Pleopoda in female reduced in number, only four pairs being present.

ANALYTICAL KEY TO THE FAMILIES OF ASELLOIDEA.[b]

a. First pair of pleopoda in the male not coupled with the second pair; the peduncles short. Second pair small and situated below the first pair. Third pair in both sexes forming a compound operculum. First pair in female small.
  b. Peduncles of first pair of pleopoda in the male free. First pair of pleopoda in female consist each of a small peduncle and a single branch. Second pair of pleopoda in male with branches attached at the distal end of the peduncle, the inner branch not geniculate, the distal joint having an inner cavity; outer branch nearly as long as inner branch. Fifth pair of pleopoda with both branches .... Family XV. ASELLIDÆ
  b'. Peduncles of first pair of pleopoda fused in the male. First pair of pleopoda in female with branches fused, forming a small operculum. Second pair of pleopoda in male with branches attached at the distal end of the inner margin of the peduncle, the inner branch geniculate, the distal joint without a cavity; outer branch much shorter than inner branch. Fifth pair of pleopoda each consisting of only a single branch .... Family XVI. STENETRIIDÆ

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[a] See Sars for characters of superfamily, Crust. of Norway, II, 1899, p. 94.

[b] Doctor Hansen (Proc. Zool. Soc. London, 1905, II, Pt. 2) divides the Asellota into but three families—the Asellidæ, the Stenetriidæ (a new family proposed by him), and the Parasellidæ—which includes all the other Asellota, and represents the families Munnidæ, Janiridæ, Desmosomidæ, and Munnopsidæ. His basis of classification is on the structure of the pleopoda alone. Although the structure of the pleopoda in this group forms excellent characters for a basis of classification, other characters must not be wholly disregarded, nor must all other characters be made subservient to this character alone. The Munnidæ, Janiridæ, and Munnopsidæ form distinct groups which differ in structures quite as essential as those recognized in other families of the order. The differentiation of the legs of the Munnopsidæ into an anterior and a posterior series, the division of the thorax into an anterior and a posterior portion, the two being quite dissimilar, are structural differences which can not be ignored. The genus *Pseudarachna* Sars has the posterior legs distinctly natatory and fringed with plumose cilia, although the joints are not as much dilated as in the other genera of the family. The Munnidæ form also a well differentiated group well separated from the Janiridæ, the characters of which are given in the following key.

a′. First pair of pleopoda in the male coupled with the second pair, the peduncles being elongate. Second pair in the male large, the peduncles situated outside of and coupled with the first pair, forming a large operculum. Third pair in both sexes not forming an operculum. First pair in female large.

b. Last three pairs of legs not natatory. Eyes usually present.

c Three posterior segments of thorax not sharply marked off from the four anterior ones, and not smaller. Caudal segment large, shieldlike. Eyes, when present, lateral or subdorsal, not placed on peduncle-like projections of the head. First pair of antennæ issuing close together. Legs subequal in length ....Family XVII. JANIRIDÆ

c′. Three posterior segments of thorax, as a rule, sharply marked off from four anterior ones, and much smaller. Caudal segment more or less vaulted above, subpyriform. Eyes, when present, placed on the tips of lateral peduncle-like projections of the head. First pair of antennæ placed widely apart. First pair of legs much shorter than others. Succeeding pairs more or less rapidly increasing in length........Family XVIII. MUNNIDÆ

b′. Last three pairs of legs natatory, with some of joints flattened and ciliated. First pair of legs shorter than three following pairs. Second, third, and fourth pairs very elongate. Eyes wanting......Family XIX. MUNNOPSIDÆ

Family XV. ASELLIDÆ.[a]

Body depressed.

Lateral parts of head scarcely expanded; front without rostrum. Segments of thorax with lateral parts lamellarly expanded. Eyes, when present, small and laterally placed.

Both pairs of antennæ with multiarticulate flagella.

Peduncle of second antennæ without scale outside of third joint. First pair of legs subcheliform; six following pairs ambulatory; dactylus usually uni-unguiculate. Four pairs of pleopoda in female. The first[b] are very small, not operculiform; each consists of a minute peduncle and a single rounded lamella. The second pair are wanting. Three succeeding pairs consist each of two lamellæ. Outer lamella of third pair very large and incrusted, and forming with the corresponding lamella of the opposite side a sort of operculum.

Five pairs of pleopoda in male. First pair small with peduncles free, short, and branches single. Second pair situated below and not coupled with first pair, with branches attached to the distal margin of the peduncle; inner branch not geniculate, its distal joint inflated and containing a large cavity at its obtuse end; outer branch nearly as long as inner one, its distal joint movable. Third pair similar to that of female. Last two pairs with both branches present.

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[a] See Sars for characters of family, Crust. of Norway, II, 1899, p. 95, and Hansen, Proc. Zool. Soc. London, 1905, p. 315.

[b] Hansen writes that the first pleopoda of the female in this family are attached far from each other. This is not true of some of the species of *Mancasellus*, as shown in the figures to follow. It is also not characteristic of all the species of *Asellus* and of *Cæcidotea*, for in several species to be mentioned later I have found the reverse to be true.

The Asellidæ are mostly fresh-water forms. All the members of the genera, *Asellus*, *Mancasellus*, and *Cæcidotea*, are found in fresh-water streams, wells, pools, and lakes. The species *Janirella* Bonnier is, however, marine.

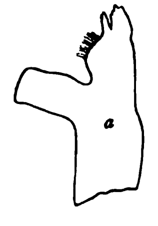

FIG. 459.—MANCASELLUS BRACHYURUS (AFTER GARMAN). *a*, MANDIBLE. *b*, OUTLINE OF ONE SIDE OF HEAD. *c*, ONE OF SECOND GENITAL PLATES OF MALE. *d*, UROPOD. *e*, HAND.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY ASELLIDÆ.

a. Mandibles without a palp. Last six pairs of legs with dactylus bi-unguiculate.
Genus *Mancasellus* Harger

a′. Mandible with a three-jointed palp.

b. Eyes present. Body oblong, depressed. Head small, narrower and shorter than first thoracic segment. Caudal segment not longer than broad.........Genus *Asellus* Geoffroy

b′. Eyes wanting. Body elongate, narrow. Head large, not narrower than first thoracic segment, and longer. Caudal segment much longer than broad.
Genus *Cæcidotea* Packard

67. Genus MANCASELLUS Harger.

Eyes present.

Mandibles without a palp. Last six pairs of legs with dactylus bi-unguiculate. Body broad, depressed. Terminal segment of body broad.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS MANCASELLUS.

a. Lateral margins of head entire.
Mancasellus brachyurus Harger

a′. Lateral margins of head not entire.

b. Uropoda shorter than terminal segment of body.

c. Uropoda half as long as terminal segment of body. Propodus of first pair of legs armed with two triangular processes. Lateral margins of head with a deep cleft on either side.
Mancasellus macrourus Garman

c′. Uropoda two-thirds as long as terminal segment of body. Propodus of first pair of legs armed with one triangular process or three acute teeth. Lateral margins of head with a large rounded sinus on either side.

d. Propodus of first pair of legs armed with one triangular process. Sides of sinus on lateral margins of head not meeting...*Mancasellus tenax* (Smith)

d′. Propodus of first pair of legs armed with three acute teeth. Sides of sinus on lateral margins of head sometimes meeting. *Mancasellus tenax dilata* Harger

b′. Uropoda as long as terminal segment of body.

c. Propodus of first pair of legs armed with one triangular process. Second pair of antennæ as long as or longer than the body. Inner branch of uropoda nearly three times as long as outer branch.......*Mancasellus lineatus* (Say)

c′. Propodus of first pair of legs armed with two processes, one triangular and the other truncate. Second pair of antennæ shorter than the body. Inner branch of uropoda twice as long as outer branch.
Mancasellus danielsi Richardson

MANCASELLUS BRACHYURUS Harger.

Mancasellus brachyurus HARGER, Am. Jour. Sci. and Arts, (3), XI, 1876, pp. 304–305.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.—BOVALLIUS, Bihang till K. svenska Vet.-Akad. Handl., XI, No. 15, 1886, p. 39.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 296; Proc. U. S. Nat. Mus., XXIII, 1901, p. 551.

Localities.—McKee's spring, Lexington, Virginia; Gaylord, Virginia.

Reported injurious to water cress.

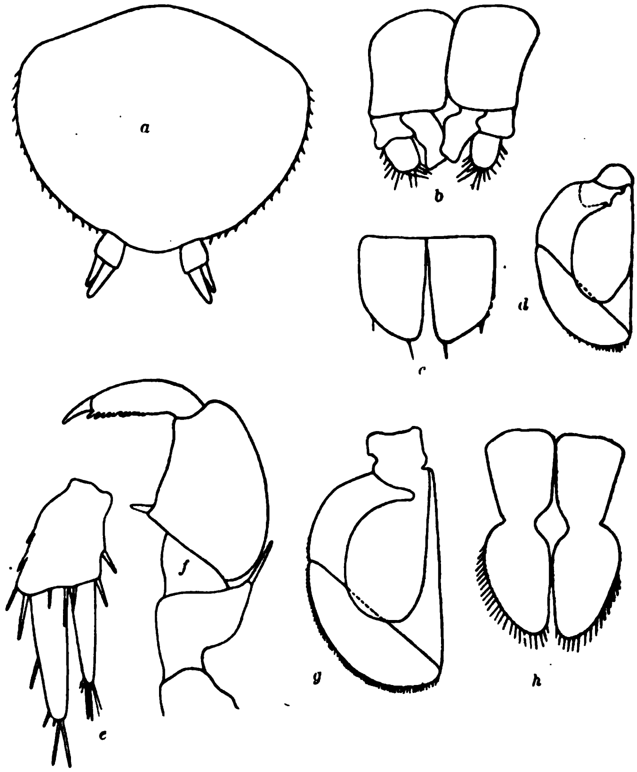

FIG. 460.—MANCASELLUS BRACHYURUS. *a*, ABDOMEN WITH UROPODA. × 9¼. *b*, SECOND PLEOPOD OF MALE. × 27¼. *c*, FIRST PLEOPOD OF FEMALE. × 27¼. *d*, THIRD PLEOPOD OF MALE. × 15¼. *e*, UROPOD. × 27¼. *f*, FIRST LEG. × 27¼. *g*, THIRD PLEOPOD OF FEMALE. × 15¼. *h*, FIRST PLEOPOD OF MALE. × 27¼.

Body about two and a third times longer than wide, 6 mm.: 14 mm. Head a little more than twice as wide as long, 1½ mm.: 3½ mm., with the anterior margin slightly excavate between the antero-lateral angles. The sides of the head are entire. The eyes are small, round, composite, and situated a short distance from the lateral margins. The first pair of antennæ have the basal article short and somewhat dilated; the second article is a little longer than the first and about half as wide; the third article is shorter than the second; the flagellum is composed of six articles. The first antennæ extend two-thirds the length of the fifth article of the peduncle of the second antennæ. The second pair of antennæ have the first article very short; the second and third are subequal and each is but little longer than the first; the fourth article is twice as long as the third; the fifth article is one and a half times longer than the fourth. The flagellum is composed of about fifty articles and extends, when retracted, to the posterior margin of the fourth thoracic segment. The maxilliped has a palp of five articles. The palp of the mandibles is wanting.

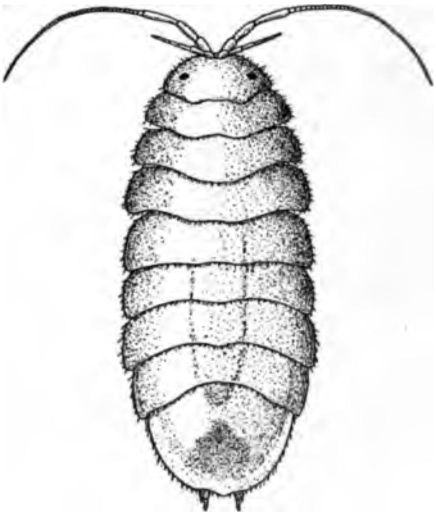
FIG. 461.—MANCASELLUS BRACHYURUS. × 4½.

The segments of the thorax are subequal, with lateral margins straight and entire. The epimera are not separated off from the segments, but are perfectly coalesced.

The abdomen is composed of a single large segment, rounded posteriorly, with a small rounded lobe between the uropoda. The uropoda are very short, being only 1 mm. long, or one-fourth the length of the abdomen, which is 4 mm. long. The peduncle is about as long as broad and shorter than the branches. The inner branch is one and a half times longer than the peduncle; the outer branch is a little shorter than the inner branch. In the female the first pleopoda are attached close together, as shown in fig. 460 *c*.

The first pair of legs are subchelate. The propodus is armed with a single large spine on the inferior margin. The dactylus is furnished with a row of small spines along the inferior margin.

MANCASELLUS MACROURUS Garman.

Mancasellus macrourus GARMAN, Bull. Essex Institute, XXII, 1890, pp. 28–30.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 297.—HAY, Proc. U. S. Nat. Mus., XXV, 1903, pp. 423–424.

Localities.—Kentucky; Tennessee; John Ross spring, at Rossville, Georgia; outside Nickajack Cave; "Old Mill" Devils Backbone, Hamilton County, Ohio; Redbank, Hamilton County, Ohio; Batavia Junction, Ohio; Westwood, Cincinnati, Ohio (J. Lindahl); Echo River, Mammoth Cave, Kentucky.

Body oblong-ovate, nearly two and a half times longer than wide, 5 mm. : 12 mm. Sides of body nearly parallel.

Head three times wider than long, 1 mm. : 3 mm., with the anterior part slightly narrower than the posterior part, the anterior margin slightly excavate on either side of a small median point, and again emarginate on either side of two small points, each lateral to the median point. The lateral margin is cleft on either side near the base, just lateral to the eyes, and the posterior part of the lateral margin below the cleft is produced into a small lobe on either side. The eyes are small, round, composite, situated near the lateral margins. The first pair of antennæ have the basal article large and dilated, and it extends to the end of the second article of the peduncle of the second pair of antennæ; the second article is a

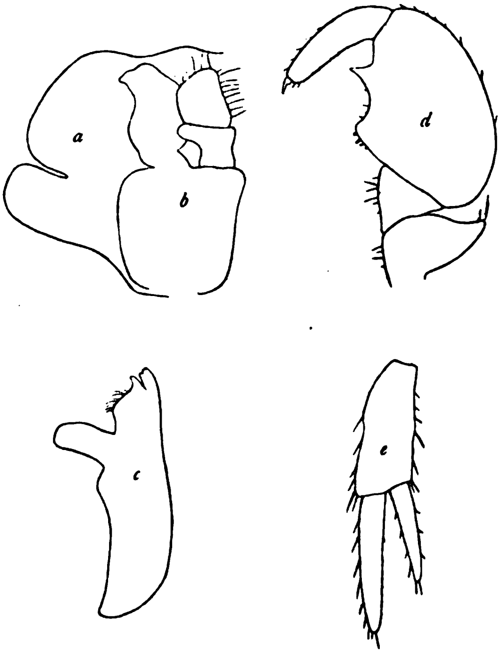

FIG. 462.—MANCASELLUS MACROURUS (AFTER GARMAN). *a*, OUTLINE OF ONE SIDE OF HEAD. *b*, ONE OF SECOND GENITAL PLATES OF MALE. *c*, MANDIBLE. *d*, HAND. *e*, UROPOD.

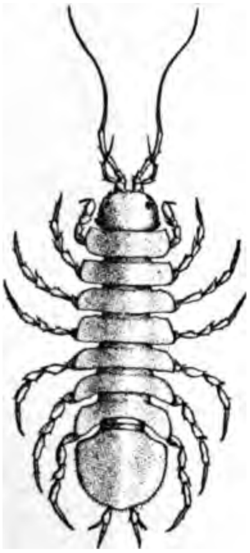

FIG. 463.—MANCASELLUS MACROURUS (AFTER HAY).

little longer than the first and half as wide; the third is half as long as the second. The flagellum is composed of six articles and extends to the middle of the fifth article of the peduncle of the second antennæ. The basal article of the second antennæ is short; the second article is about as long as the first; the third is as long as the second; the fourth is equal to the first three taken together; the fifth is one and a half times longer than the fourth. The flagellum is composed of forty-three articles and extends to the posterior margin of the sixth thoracic segment, and is 9 mm. long. The maxillipeds have a palp of five articles. The palp of the mandibles is wanting.

The first segment of the thorax is a little longer than any of the others, being 1½ mm. long. The others are subequal and each is 1 mm. in length. The lateral margins are straight and entire and the epimera are not separated off from the segments.

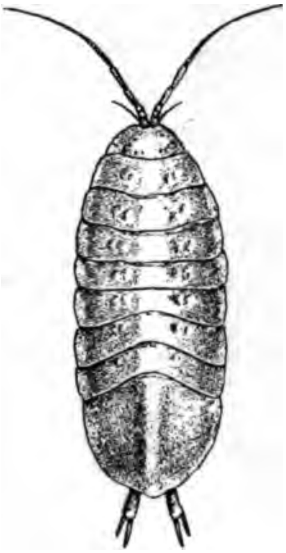
FIG. 464.—MANCASELLUS MACROURUS (AFTER GARMAN).

The abdomen is composed of one short segment, visible only in the middle of the dorsal surface and covered at the sides by the last thoracic segment, and one large terminal segment,

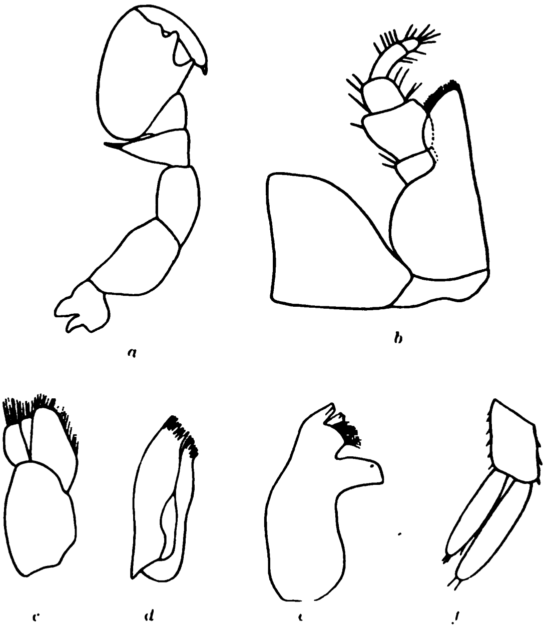

FIG. 465.—MANCASELLUS MACROURUS. *a*, FIRST LEG. × 15½. *b*, MAXILLIPED. × 27½. *c*, SECOND MAXILLA. × 27½. *d*, FIRST MAXILLA. × 27½. *e*, MANDIBLE. × 27½. *f*, UROPOD. × 15½.

which is 4 mm. in length and has the posterior margin widely rounded. The terminal segment is 5 mm. wide at the base. The uropoda are half as long as the terminal abdominal segment. The peduncle is 1 mm. long. The outer branch is 1 mm. long. The inner branch is a very little longer than the outer branch. In the female the first pleopoda are attached close together as in the preceding species.

The first pair of legs are strongly prehensile and have the propodus greatly dilated and the inferior margin armed with two triangular processes. All the other legs are ambulatory.

MANCASELLUS TENAX (Smith).

Asellus tenax SMITH, Amer. Jour. Science and Arts, (3), II, 1871, pp. 453–454.

Asellopsis tenax HARGER, Amer. Jour. Science and Arts, (3), VII, 1874, p. 601; HARGER in SMITH, Report U. S. Commissioner of Fish and Fisheries, 1874, pp. 659–660, pl. I, fig. 3.

Mancasellus tenax HARGER, Amer. Jour. Science and Arts, (3), XI, 1876, p. 304.—HAY, Amer. Nat., XVI, 1882, p. 242.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 297.

Localities.—Lake Superior; Indiana; Michigan; Lake Huron.

Body oblong-ovate, a little more than two and a half times longer than wide, 3 mm. : 8 mm.

Head twice as wide as long, 1 mm. : 2 mm., with the anterior margin excavate on either side of a small median point. Lateral margins somewhat expanded in an anterior and a posterior lobe, the posterior lobe being produced laterally much beyond the anterior lobe. Between the anterior and the posterior lobe the lateral margin is slightly excavate. The eyes are small, round, composite, and situated opposite the excavation a short distance from the lateral margin. The first pair of antennæ have the first article large and dilated; the second article is half as wide as the first article and twice as long; the third article is less than half the length of the second. The flagellum is composed of six articles. The first antennæ extend to the end of the fourth article of the peduncle of the second pair of antennæ. The second antennæ have the first three articles short and subequal; the fourth is about as long as the first three taken together; the fifth is about one and a half times longer than the fourth. The flagellum is composed of thirty articles, and extends to the posterior margin of th

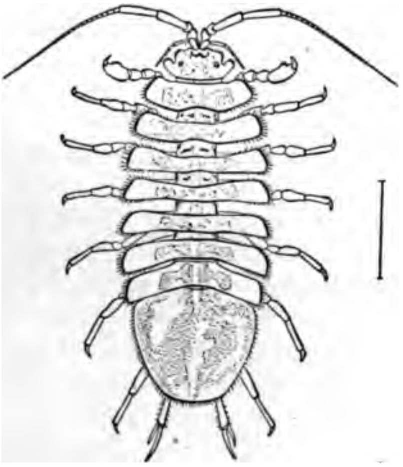

FIG. 466.—MANCASELLUS TENAX (AFTER HARGER).

sixth thoracic segment, when retracted. The maxilliped has a palp of five articles. The palp of the mandibles is wanting.

The segments of the thorax are subequal with lateral margins entire. The epimera are not separated from the segments, being entirely coalesced, with no indication of a separation.

The abdomen consists of two short segments followed by a large terminal one, rounded posteriorly. There is no lobe on the posterior margin between the uropoda. The uropoda are shorter than the terminal abdominal segment. The length of the terminal abdominal segment is 3 mm. The length of the uropoda is 2 mm. The peduncle of the uropoda is 1 mm. The inner branch is as long as the peduncle, being 1 mm. long. The outer branch is half as long as the inner branch.

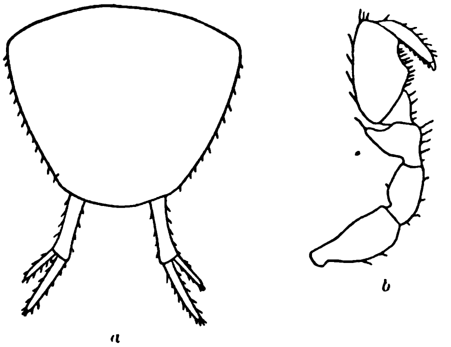

FIG. 467.—MANCASELLUS TENAX. *a*, ABDOMEN WITH UROPODA. × 11⅓. *b*, FIRST LEG. × 20⅓.

The first pair of legs are subchelate. The propodus has a single triangular expansion on the inferior side. There are numerous spines on the inferior margin of the propodus and dactylus. All the other pairs of legs are ambulatory with dactyli bi-unguiculate.

MANCASELLUS TENAX DILATA Smith.

Mancasellus tenax dilata SMITH, Report U. S. Commissioner of Fish and Fisheries, 1874, p. 661.

Locality.—Detroit River.

"The flagellum of the antennulæ contains one or two more segments [than in the preceding species]. The lateral portions of the head and segments of the body, especially in fully adult specimens, are expanded so that the outline of the animal is a broader oval. The open sinus in the lateral margin of the head is a narrow incision, rounded at the bottom, but with the sides sometimes meeting. The propodus in the first pair of legs is nearly as much enlarged in the males as in *A. communis*, and is armed on its palmary margin with three acute teeth, of which the middle one is the largest."—SMITH.

MANCASELLUS LINEATUS (Say).

Asellus lineatus SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 428.—DE KAY, Nat. Hist. New York, Pt. 6, 1844, p. 50.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.

Mancasellus lineatus RICHARDSON, American Naturalist, XXXIV, 1900, p. 297; Proc. U. S. Nat. Mus., XXIII, 1901, p. 551.

Locality.—South Carolina.

"Body oblong; interior antennæ much shorter than the peduncle of the exteriors; caudal appendices, peduncle cylindrical.

"Inhabits South Carolina.

"Cabinet of the Academy.

"Body oblong, not distinctly attenuated before; segments subequal, entire; head at base equal to the preceding segment, a sinus each side in the middle; eyes prominent, black; antennæ, exteriors as long as the body in one sex; in the other, longer, interiors nearly attaining the tip of the second joint; hands with a prominent angle on the middle of the inferior edge, thumb closing on and surpassing the angle, shorter than the hand; nails somewhat bifid at tip; terminal caudal segment longitudinally subovate, styles elongated cylindrical, equal to the terminal segment of the body, laciniæ very unequal, inner one nearly thrice the length of the outer one, truncate at tip; color, pale brown with a double dorsal brown line, united at the tip of the tail, a brown line or two each side of the tail. Length nearly one-fourth of an inch.

"This animal is not an uncommon inhabitant of the swamps in the forests of South Carolina. It might be referred to the genus *Janira* of Doctor Leach."—SAY.[a]

MANCASELLUS DANIELSI Richardson.

Mancasellus danielsi RICHARDSON, Proc. U. S. Nat. Mus., XXV, 1902, pp. 505–507.

Locality.—Lily Lake, La Porte, Indiana.

Body broadly oval, with lateral parts of segments widely expanded. Head broader posteriorly than anteriorly, the posterior part being as wide as the first thoracic segment. Lateral margins have a deep and wide incision which separates the narrower anterior lobes from the widely expanded posterior lobes. The eyes are opposite these incisions. The frontal margin is produced in a small median point, on either side of which is a shallow depression, followed by another point, in turn succeeded by a slight depression. The antennulæ are short, reaching only to the extremity of the fourth joint of the peduncle of the antennæ; the flagellum consists of eight joints. The antennæ are very long, extending nearly the entire length of the body. The mandible is without a palp.

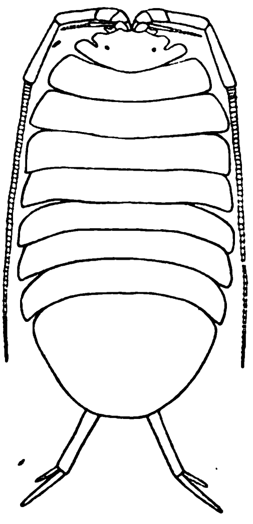

FIG. 468.—MANCASELLUS DANIELSI. × 3½.

The thoracic segments are subequal in length. The lateral parts are widely expanded, with lateral margins entire.

The caudal segment is narrower posteriorly than anteriorly, with

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[a] Jour. Acad. Nat. Sci. Phila., I, 1818, p. 428.

the end obtusely rounded. Width of segment at base about one and one-half times its length.

The caudal stylets are long and slender, the length of the stylet being equal to the length of the caudal segment. The basal joint is equal to the length of the fifth peduncular joint of the antennæ. The outer branch is half as long as the inner branch.

The first pair of legs are subchelate. The propodus is broadly expanded and armed on the inner margin with a large tooth about halfway between the base and the articulation of the joint with the dactylus. Between the tooth and the articulation of the dactylus with the propodus is a process having a blunt, truncate extremity. The dactylus is provided with two teeth near the base on the inner margin. The carpus is small and triangular in shape. The merus is produced at the upper outer angle.

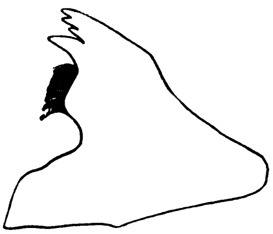

FIG. 469.—MANCASELLUS DANIELSI. MANDIBLE.

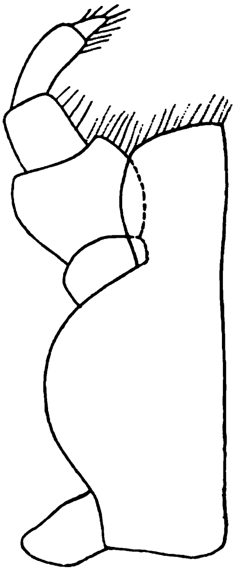

FIG. 470.—MANCASELLUS DANIELSI. MAXILLIPED. (GREATLY ENLARGED.)

The remaining six pairs of legs are similar in structure and ambulatory in character, with biunguiculate dactyli.

Three specimens were found at Lily Lake, Laporte, Indiana, by Mr. Daniels.

Type.—Cat. No. 25693, U.S.N.M.

This species is more closely related to *M. tenax* (Smith) than to any other species of the genus. It differs, however, from *M. tenax* in the greater length of the antennæ, which extend nearly the entire length of the body, while in *M. tenax* they are only half the length of the body; in the greater width of the caudal segment in proportion to its length, the width being one and one-half times the length, while in *M. tenax* the width and length of this segment are about equal; in the greater length of the caudal stylets, which are equal to the length of the caudal segment, while in *M. tenax* they are only a little longer than half the length of the caudal segment; in the greater length of the basal segment of the stylet, its length being equal to the length of the fifth joint of the peduncle of the antennæ, while in *M. tenax* it is equal to the length of the fourth joint of that organ (the fourth joint of the peduncle of the antennæ in both species being shorter than the fifth joint); in the greater breadth of the entire body in proportion to its length, *M. tenax* being narrower in width as compared to its length; and in the difference in the legs of the first pair, the propodus in *M. tenax* being armed with one broad low tubercle (in the subspecies *dilata* the propodus is armed with three acute teeth), while in *M. danielsi* the propodus is armed with one large tooth and one bluntly ending, truncate process, the dactylus being provided with two teeth at the base, the dactylus in *M. tenax* being armed with spines on the inner margin, of which the distal ones are the larger, and at the end with a large spine.

This species differs from *M. lineatus* (Say) in having antennæ somewhat shorter, in the fact that the propodus of the first pair of legs is provided with a bluntly ending process between the long tooth, situated about the middle on the inferior margin, and the articulation of the dactylus with the propodus, and in the longer outer branch of the caudal stylets, it being half as long as the inner branch, while in *M. lineatus* it is only one-third the length of the inner one.

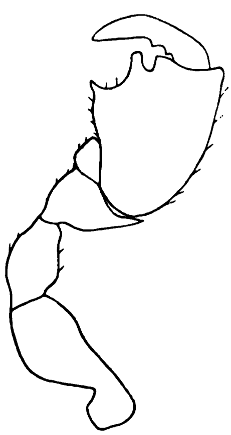

FIG. 471.—MANCASELLUS DANIELSI. LEG OF FIRST PAIR. × 14⅓.

Named for Mr. L. E. Daniels, by whom the specimens were collected.

68. Genus ASELLUS Geoffroy.

Mandibles with a palp. Last six pairs of legs with dactylus uniunguiculate. Eyes present.

Body broad, depressed. Head small, narrower and shorter than first thoracic segment.

Terminal segment of body very broad, not longer than broad.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ASELLUS.

a. Propodus of first pair of legs armed with two triangular processes, one or both processes sometimes replaced by a strong spine.
  b. Uropoda almost as long as the terminal segment of the body. Epimera present on all the segments of the thorax.
    c. Head with lateral margins not produced in a lobe on either side. Second pair of antennæ extend to the posterior margin of the fifth thoracic segment. First pair of antennæ extend to the end of the peduncle of the second antennæ; flagellum composed of fourteen articles.
      Asellus communis Say
    c′. Head with lateral margins produced in a lobe on either side. Second pair of antennæ extend to the posterior margin of the seventh thoracic segment. First pair of antennæ extend to the middle of the fifth article of the peduncle of the second pair of antennæ; flagellum composed of nine articles.
      Asellus intermedius Forbes
  b′. Uropoda about half as long as the terminal segment of the body. Epimera not present on all the segments of the thorax.

c. Epimera present on the first segment of the thorax only. Head with the lateral margins produced in a lobe on either side. First pair of antennæ, with a flagellum of twelve articles, extend to the middle of the fifth article of the peduncle of the second antennæ. Second pair of antennæ extend to the posterior margin of the fifth thoracic segment. Inner branch of the uropoda is as long as the peduncle. Uropoda one-fourth of a millimeter longer than half the length of the terminal segment of body.
Asellus brevicauda Forbes

c'. Epimera not evident on any of the segments of the thorax. Head with the lateral margins not produced in a lobe on either side. First pair of antennæ, with a flagellum of seven articles, extend almost to the end of the fourth article of the peduncle of the second antennæ. Second pair of antennæ extend to the posterior margin of the seventh thoracic segment. Inner branch of uropoda is twice as long as peduncle. Uropoda one-third of a millimeter shorter than half the length of the terminal segment of the body .... *Asellus hoppinæ* Faxon

a'. Propodus of first pair of legs not armed with two triangular processes.

b. Propodus of first pair of legs furnished with few spines.

c. Second pair of antennæ as long as the body. Propodus of first pair of legs elliptical in outline and armed with one long spine. Terminal segment of body with median lobe small .... *Asellus attenuatus* Richardson

c'. Second pair of antennæ extend to the posterior margin of the fifth thoracic segment. Propodus of first pair of legs produced in the male on the inferior margin in a roundly triangulate expansion furnished with three long spines. Terminal segment of body with median lobe large and conspicuous .... *Asellus aquaticus* (Linnæus)

b'. Propodus of first pair of legs furnished with numerous short spines or stiff hairs .... *Asellus tomalensis* Harford

ASELLUS COMMUNIS Say.

Asellus communis Say, Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 427–428.

Asellus vulgaris Gould, Invertebrata of Massachusetts, 1841, p. 337.

Asellus communis De Kay, Nat. Hist. New York, Pt. 6, 1844, p. 49.—Smith, Report U. S. Commissioner of Fish and Fisheries, 1874, Pt. 2, p. 657, pl. I, fig. 4.

Asellus militaris Hay, Bull. Ill. State Lab. Nat. Hist., No. 2, 1878, p. 90.

Asellus communis Hay, American Naturalist, XVI, 1882, p. 241.—Underwood, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 358.—Richardson, American Naturalist, XXXIV, 1900, p. 297; Proc. U. S. Nat. Mus., XXIII, 1901, p. 551.—Paulmier, Bull. New York State Museum, 1905, p. 178.

Localities.—Schuylkill River, Pennsylvania; Connecticut; Massachusetts; New York; Indiana; Illinois; Michigan; Mississippi; Sandusky, Ohio (E. L. Moseley); Cincinnati, Ohio; Rhode Island; edge of Potomac River, Virginia side.

Body oblong-ovate, three times longer than wide, 5 mm. : 15 mm. Sides of body almost parallel.

Head twice as wide as long, 1½ mm. : 3 mm., with the anterior margin excavate. The head is narrower anteriorly than posteriorly, being only 2 mm. wide in front. The eyes are small, round, composite, and situated at the sides of the head, halfway between the anterior and the posterior margins. The first pair of antennæ have the basal articles wide but short, and extending to the end of the second article of the peduncle of the second pair of antennæ; the second article is one and a half times longer than the first article; the third article is three-fourths as long as the second. The flagellum is composed of fourteen articles, and extends to the end of the peduncle of the second pair of antennæ. The second pair of antennæ have the first three articles short and subequal; the fourth article is as long as the first three taken together; the fifth is one and two-thirds times longer than the fourth. The flagellum is composed of about ninety articles, and extends to the posterior margin of the fifth thoracic segment, and is 10 mm. long. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

The first segment of the thorax is slightly longer than any of the others, which are subequal, being each 1 mm. in length. The first segment is 1½ mm. long. All the segments, including the first, have small epimera situated at the antero-lateral angles of the segments.

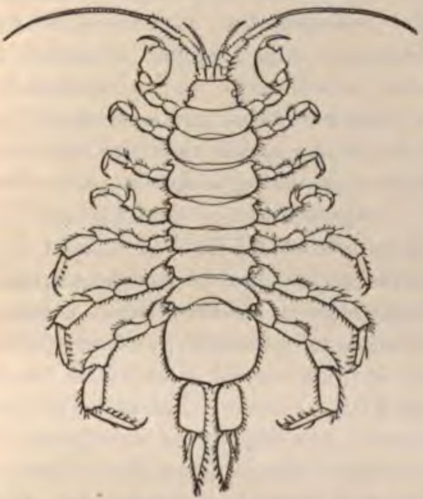

FIG. 472.—ASELLUS COMMUNIS (AFTER SMITH).

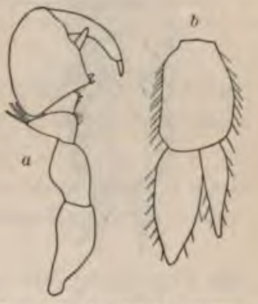

FIG. 473.—ASELLUS COMMUNIS. *a*, FIRST LEG OF MALE. × 11⅓. *b*, UROPOD. × 11⅓.

The abdomen is composed of two short segments, visible only in the middle of the dorsal surface, and a large terminal segment, 5 mm. wide and 4½ mm. long, with the post-lateral angles rounded and the posterior margin produced in a broad triangular process between the uropoda. The uropoda are about as long as the terminal abdominal segment, being 4 mm. long. The peduncle is 2 mm. in length and is 1 mm. wide. The inner branch of the uropoda is broad and tapers to a narrow, acute extremity. The outer branch is half as wide and is about two-thirds the length of the inner branch; it is also produced to a narrow and pointed extremity. In the female the first pleopoda are attached close together.

The first pair of legs are prehensile and have the propodus greatly expanded, and the inferior margin produced in one long and one sh triangular process. All the other legs are ambulatory.

ASELLUS INTERMEDIUS Forbes.

Asellus intermedius FORBES, Bull. Ill. Museum of Nat. Hist., No. 1, 1876, pp. 10–11.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 358.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 297.

Localities.—Found in hill country of southern Illinois, under stones in small streams.

Body oblong-ovate, about three times as long as wide, 2 mm.: 7 mm.

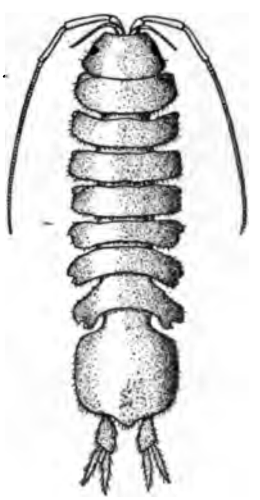

FIG. 474.—ASELLUS INTERMEDIUS. × 7.

Head wider than long, 1 mm.: 1½ mm., with the anterior margin straight. Sides of head entire, with a small lobe on either side near the base. Eyes small, composite, and situated close to the lateral margins, halfway between the anterior and the posterior margins. The first pair of antennæ have the basal article large and somewhat dilated; the second article is half as wide as the first and about as long; the third article is a little more than half as long as the second. The flagellum is composed of nine articles and extends to the middle of the fifth article of the peduncle of the second pair of antennæ. The second antennæ have the first three articles short and about equal in length; the fourth article is about as long as the first three taken together; the fifth is one and a half times longer than the fourth. The flagellum is composed of about fifty articles and extends a short distance beyond the posterior margin of the seventh thoracic segment. The maxilliped has a palp of five articles. The palp of the mandibles is composed of three articles.

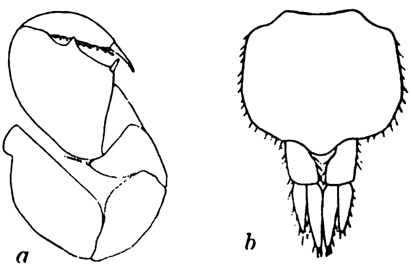

FIG. 475.—ASELLUS INTERMEDIUS. *a*, FIRST LEG. × 39. *b*, ABDOMEN WITH URPODA. × 11½.

The first segment of the thorax has the lateral margins entire, with the anterior angle not developed and the epimeral lobe large and conspicuous and placed antero-laterally. The second, third, and fourth segments have the lateral margins entire, with the antero-lateral angles well developed, and the epimera small and almost inconspicuous and placed antero-laterally. The fifth segment has the anterior part of the lateral margin produced in a well-defined lobe, with the epimeron large and conspicuous and placed about the middle of the lateral margin, just below the anterior lobe. The sixth and seventh segments have the posterior part of the lateral margin excavate, the anterior part projecting in a large lobe, and the epimera large and conspicuous and posteriorly situated just below the middle of the lateral margin.

The abdomen is composed of two short segments followed by a large terminal segment, which has a large rounded median lobe on the posterior margin between the uropoda. The uropoda are as long as the terminal abdominal segment. The outer branch is as long as the peduncle. The inner branch is one and one-third times longer than the outer branch.

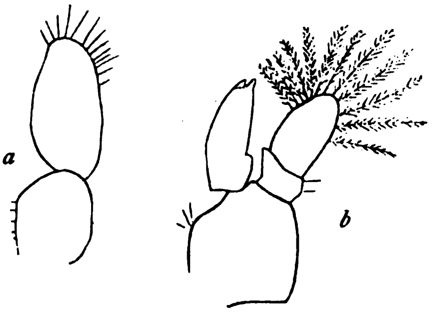

FIG. 476.—ASELLUS INTERMEDIUS (AFTER FORBES). *a*, ONE OF FIRST PAIR OF GENITAL PLATES OF MALE. × 51. *b*, ONE OF SECOND PAIR OF GENITAL PLATES OF MALE. × 51.

The first pair of legs are subchelate, and have the propodus armed on the inferior margin with a triangular process about the middle, and below this a strong conspicuous spine. The inferior margin of the dactylus is furnished with a row of numerous short spines. All the other pairs of legs are ambulatory.

The types of this species from which the above description is made were sent to me from the Museum of Comparative Zoology of Harvard University.

Specimens collected in the Potomac River near Wasnington of the same or perhaps a closely related species differ only in their larger size, being 4 mm.: 11 mm.; in having three more articles in the flagellum of the first antennæ, the flagellum of the second antennæ having also a larger number of articles, sixty-three altogether, and in having the uropoda equal to two-thirds the length of the terminal segment.

ASELLUS BREVICAUDA Forbes.

Asellus brevicauda Forbes, Bull. Ill. Museum Nat. Hist., No. 1, 1876, pp. 8-10.—Underwood, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.—Richardson, American Naturalist, XXXIV, 1900, p. 297.

Localities.—Found in clear, rocky rills in Jackson and Union counties, in southern Illinois; small creek emptying into Redfoot Lake, Tennessee.

Body oblong-ovate, three times longer than wide, 4 mm.: 12 mm.

Head more than twice as wide as long, 1 mm.: 2½ mm., with the anterior margin excavate and the antero-lateral angles somewhat truncate. The eyes are small, round, composite, and situated at the sides of the head, halfway between the anterior and the posterior margins. The lateral margin of the head near the base is produced in a small lobe on either side. The first pair of antennæ have the basal article short and broad; the second article is a little longer than the first and more slender; the third article is about half as long as the second. The flagellum is composed of twelve articles. The first antennæ extend to the middle of the fifth article of the peduncle of the second pair of antennæ. The first three articles of the second antennæ are short and subequal; the fourth article is as long as the first three together; the fifth is one and a half times longer than the fourth. The flagellum is composed of about seventy-five articles and extends to the posterior margin of the fifth thoracic segment and is 6 mm. long. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

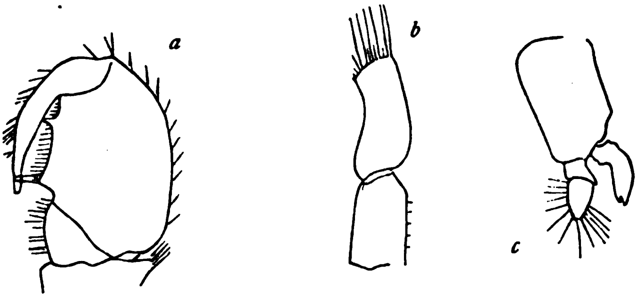

FIG. 477.—ASELLUS BREVICAUDA (AFTER FORBES). *a*, HAND OF MALE. × 27. *b*, ONE OF FIRST PAIR OF GENITAL PLATES OF MALE. × 51. *c*, ONE OF SECOND PAIR OF GENITAL PLATES OF MALE. × 25.

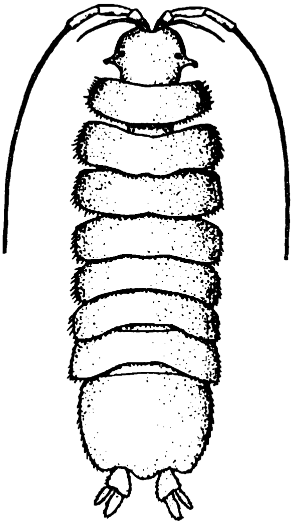

FIG. 478.—ASELLUS BREVICAUDA. × 5.

The segments of the thorax are subequal, each being about 1 mm. in length. The lateral margins of all the segments are straight and entire.

Epimera are present on the first segment only and are placed at the antero-lateral angles.

The first two segments of the abdomen are short and visible only in the middle of the dorsal surface, being covered at the sides by the seventh thoracic segment. The terminal segment is 4 mm. wide and 3½ mm. long. The post-lateral angles are rounded and the posterior margin produced in a broadly rounded lobe between the uropoda.

The uropoda are 2 mm. ' The peduncle is 1 mm. long and 1 mm. wide. The inner branch is 1 mm. long. The outer branch is narrower and slightly shorter than the inner branch.

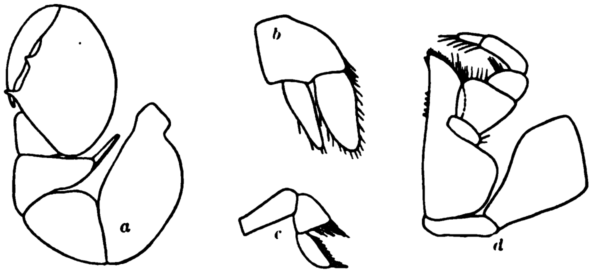

FIG. 479.—ASELLUS BREVICAUDA. *a*, FIRST LEG. × 27½. *b*, UROPOD. × 15½. *c*, PALP OF MANDIBLE. × 27½. *d*, MAXILLIPED. × 27½.

The first pair of legs are strongly prehensile, with the propodus greatly dilated and the inferior margin produced into two spines. All the other legs are ambulatory.

ASELLUS HOPPINÆ Faxon.

Asellus hoppinæ FAXON in GARMAN, Bull. Mus. Comp. Zool., XVII, No. 6, 1888–89, p. 225–239.

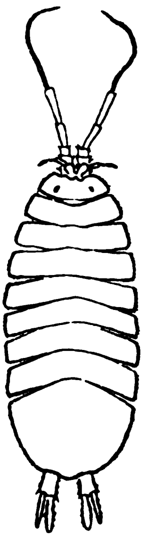

FIG. 480.—ASELLUS HOPPINÆ (AFTER FAXON). × 4.

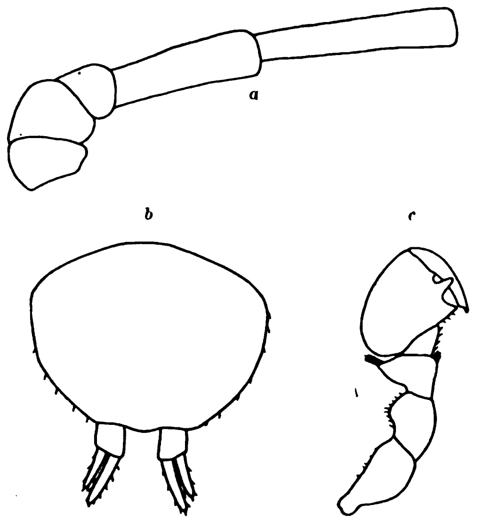

FIG. 481.—ASELLUS HOPPINÆ. *a*, PEDUNCLE OF SECOND ANTENNÆ. × 15½. *b*, ABDOMEN WITH UROPODA. × 9½. *c*, FIRST LEG. × 15½.

Locality.—Day's Cave, Missouri, in mud under stones.

Body oblong-ovate, a little more than twice as long as wide, 4½ mm. 10½ mm.

Head twice as wide as long, 1½ mm. : 3 mm., with the anterior margin sinuate on either side of a small median point. Eyes dorsally situated, with the sides of the head expanded. Lateral margins entire. The first pair of antennæ have the basal article large and expanded; the second article is as long as the first article and half as wide; the third is short, about half as long as the second. The flagellum is composed of seven articles, and extends almost to the end of the fourth article of the peduncle of the second pair of antennæ. The second antennæ have the first two articles short and subequal; the third is a little shorter than either of the first two; the fourth article is as long as the first two taken together; the fifth is one and a half times longer than the fourth. The flagellum is composed of about forty-one articles. The second antennæ are about 9 mm. long and extend to the posterior margin of the seventh thoracic segment. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

The segments of the thorax are subequal, with lateral margins straight and entire. The epimera are not evident and are not separated from the segments.

The abdomen is composed of a single segment. It is rounded posteriorly, with a slight indication of a median lobe between the uropoda. The uropoda are short, being less than half the length of the abdomen. The length of the abdomen is 3½ mm.; that of the uropoda is 1½ mm. The basal segment or peduncle of the uropoda is ½ mm. long. The inner branch is 1 mm. long. The outer branch is a little shorter than the inner branch, being about three-fourths its length.

The first pair of legs are subchelate, with the propopus armed with two triangular processes on the inferior margin. All the other legs are ambulatory.

ASELLUS ATTENUATUS Richardson.

Asellus attenuatus RICHARDSON, American Naturalist, XXXIV, 1900, p. 297; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 552-553.

Locality.—Washington Ditch, Dismal Swamp, Virginia.

Body narrowed anteriorly, gradually increasing in width backward.

Head narrower than the first thoracic segment, rounded at the sides with margins entire and a small lobe near the base on either side; front somewhat excavate for the reception of the antennæ. Eyes distinct, lateral. First pair of antennæ as long as the peduncle of the second pair: first joint short and broad; second joint more slender; third joint not quite as long as second joint; flagellum composed of thirteen joints. Second pair of antennæ as long as the body; first, second, and third joints short, about equal in length; fourth and fifth joints long; flagellum multiarticulate.

Segments of the thorax with the lateral margins of the first segment slightly emarginate anteriorly, the emargination being filled by the epimeron; second, third, and fourth segments with the margins entire, the epimera evident at the extreme anterior angles; the fifth segment with the posterior two-thirds emarginate, the epimeron conspicuous in the emargination; the sixth and seventh segments posteriorly emarginate, with prominent epimera.

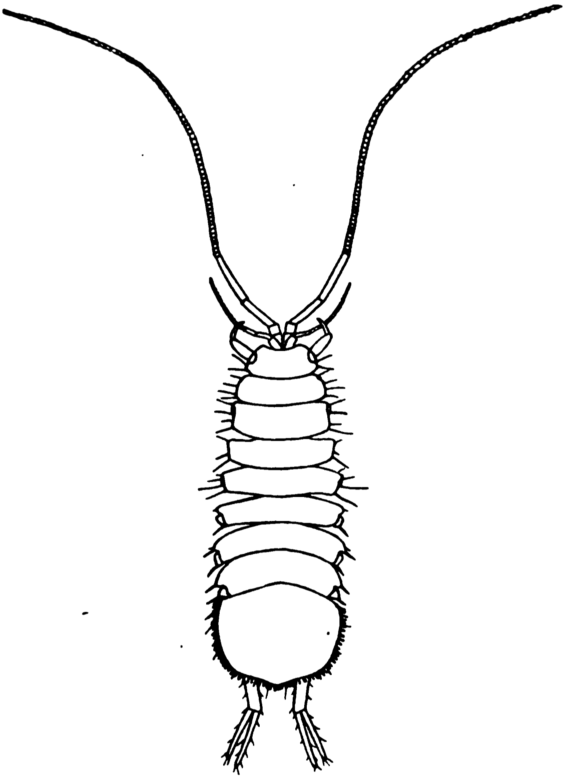

FIG. 482.—ASELLUS ATTENUATUS.

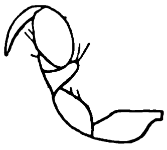

FIG. 483.—ASELLUS ATTENUATUS. LEG OF THE FIRST PAIR OF FEMALE.

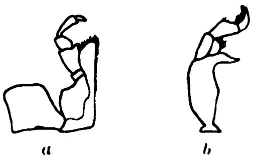

FIG. 484.—ASELLUS ATTENUATUS. a, MAXILLIPED. b, MANDIBLE.

Terminal segment of the body about as broad as long, with a small rounded lobe in the middle of the posterior margin. The uropoda are somewhat longer than the terminal segment, extremely slender and cylindrical in shape, with both branches nearly equal in length, and longer than the peduncle. The first pleopoda in the female are attached clos together.

The legs of the first pair are slender; the dactylus is serrate with numerous closely set short spines along the inner margin, the propodus is narrow, oval in shape, and armed in the male with one long spine.

The color is reddish-brown mottled with white. All the free margins of the body are fringed with hairs. The lateral margins of the segments and the caudal segment are armed with spines. The uropoda and the legs are spinulose.

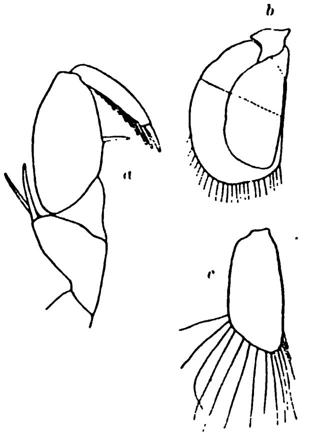

FIG. 485.—ASELLUS ATTENUATUS. *a*, LEG OF THE FIRST PAIR. × 39. *b*, THIRD PLEOPOD OF FEMALE. × 20½. *c*, FIRST PLEOPOD OF FEMALE.

A large number of specimens were collected by Mr. William Palmer and Dr. Paul Bartsch at Washington Ditch, Dismal Swamp, Virginia.

Type.—Cat. No. 23910, U.S.N.M.

ASELLUS AQUATICUS (Linnæus).

Oniscus aquaticus LINNÆUS, Fauna Suecica, 2d ed., 1761, p. 500.

Squilla asellus DE GEER, Mémoires pour servir à l'histoire des Insectes, VII, 1778, p. 496.

Oniscus aquaticus O. FABRICIUS, Fauna groenlandica, 1780, p. 251.

Asellus vulgaris LATREILLE, Hist. Nat. Crust. et des Insectes, VI, 1803, p. 359; VII, pl. LVIII, fig. 1.

Idotea aquatica LATREILLE, Encycl. Méth., Pt. 24, 1818, p. 6, pl. CCCXXVIII, figs. 21–22.

Asellus vulgaris DESMAREST, Consid. Generales sur la classe des Crustacés, 1825, p. 313, pl. XLIX, figs. 1–2.

Asellus grönlandicus? KRØYER, Kongelige danske videnskabernes Selskabs naturvidenskabelige og mathematiske Afhandlinger, VII, 1838, p. 318.

Asellus aquaticus GUERIN-MÉNEVILLE, Iconographie du Règne animal de Cuvier, pl. LI, fig. 3.—SARS, Histoire naturelle des Crustacés d'eau douce de la Norvège, 1867, p. 46, pls. VIII–X.

Asellus grönlandicus PACKARD, Mem. Bost. Soc. Nat. Hist., I, 1867, p. 296.

Asellus aquaticus BATE and WESTWOOD, Brit. Sessile-eyed Crust., II, 1868, p. 341.—BOVALLIUS, Bihang till K. Sv. Vet.-Akad., Handl., XI, No. 15, 1886, pp. 7–10. (See Bovallius for full synonymy.)

Asellus grønlandicus? HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 190.

Asellus aquaticus G. O. SARS, Crust. of Norway, II, 1899, p. 97.

Localities. Greenland (Fabricius); Greenland (Krøyer); Labrador at Square Island and Hopedale (Packard); ponds and streams all over Europe.

This species has three times been recorded from Greenland. O. Fabricius recorded it as *Oniscus aquaticus*. Krøyer records it as *Asellus grönlandicus?* He says of it:[a]

> This species is without doubt the one mentioned by Fabricius under No. 227, and which he himself did not see, although it does not appear to be rare. It approaches so closely our *Asellus vulgaris* that it is extremely difficult to find sufficient distinguishing characters in the two. Nor am I entirely certain that I have found such distinguishing characters, and therefore hesitatingly give this animal as a distinct species, although it seems almost incredible to me that the fresh waters of both Europe and Greenland should be inhabited by the identical species of *Asellus*.

Hansen[b] says of *Asellus grønlandicus* that it is probably not different from *Asellus aquaticus*.

Packard records it from Greenland as *Asellus grönlandicus*.

Specimens collected in Greenland, sent to me from the Museum of Comparative Zoology at Harvard University and labeled *Asellus grönlandicus*, do not differ in any respect from *Asellus aquaticus* as described and figured by G. O. Sars.

Body narrow, elongate, nearly three times as long as wide, 3 mm: 8½ mm., narrower anteriorly and becoming wider posteriorly. 3 mm. is its greatest breadth.

Head about twice as wide as long, 1 mm: 2 mm., with the anterior margin slightly excavate. Lateral margins entire, with a small lobe on either side near the posterior margin. Eyes small, distinct, composed of only three or four ocelli and situated close to the lateral margin, halfway between the anterior and posterior margins. The first pair of antennæ have the basal article large and dilated; the second article is half as wide and but little longer; the third article is two-thirds the length of the second. The flagellum is composed of eleven articles and extends to the end of the peduncle of the second pair of antennæ. The second pair of antennæ have the first two articles short and subequal; the third is one and a half times longer than the second; the fourth article is nearly as long as the first three taken together; the fifth is one and two-thirds times as long as the fourth. The flagellum is composed of about forty-four articles, and extends to the posterior margin of the fifth thoracic segment. It measures 6 mm. in length.

The first segment of the thorax has the epimera conspicuous and situated in the antero-lateral corners. In the second and third segments they are small and almost inconspicuous lobes situated at the antero-lateral corners of the segments. In the fourth segment they are small and inconspicuous and situated just below the antero-lateral

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[a] Kongelige danske videnskabernes Selskabs naturvidenskabelige og mathematiske Afhandlinger, VII, 1838, p. 318.

[b] Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 190.

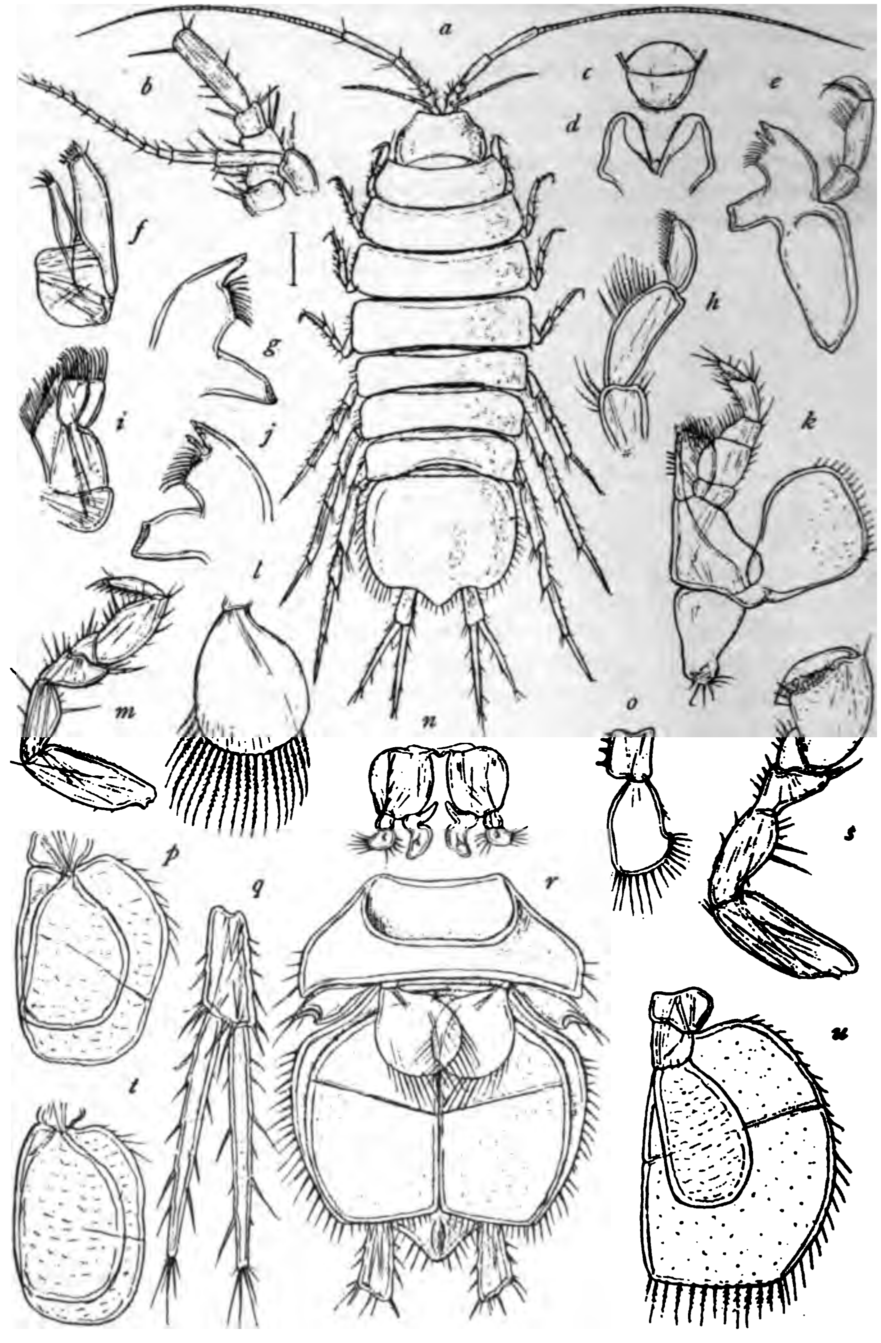

Fig. 486.—Asellus aquaticus (After Sars). *a*, Dorsal view of female. *b*, First and second antennæ. *c*, Upper lip. *d*, Lower lip. *e*, Left mandible. *f*, First maxilla. *g*, Right mandible. *h*, Palp of mandible. *i*, Second maxilla. *j*, Left mandible. *k*, Maxilliped. *l*, First pleopod of female. *m*, First leg. *n*, Second pleopod of male. *o*, First pleopod of male. *p*, Fourth pleopod of female. *q*, Uropod. *r*, Abdomen of female. *s*, First leg of male. *t* Fifth pleopod of female. *u*, Third pleopod of female.

angle of the segment. In the fifth segment they are large and conspicuous and situated about the middle of the lateral margin. In the sixth and seventh segments they are large and conspicuous and situated in the posterior corners of the segments.

The abdomen is composed of two short segments, followed by the large terminal segment, which has the posterior margin produced in a large triangular median lobe between the large post-lateral expansions. The peduncle of the uropoda is twice as long as wide. The branches are of equal length and two and a half times longer than the peduncle.

The first pair of legs are subchelate. The propodus in the male has the inferior margin near the proximal end produced in a rounded expansion, bearing three long spines. The inferior margin of the dactylus is furnished with spines along the entire margin. All the other legs are ambulatory, with dactylus uni-unguiculate.

ASELLUS TOMALENSIS Harford.

Asellus tomalensis Harford, Proc. Cal. Acad. Sci., VII, Pt. 1, 1877, pp. 54–55.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 856; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 322; American Naturalist, XXXIV, 1900, p. 297; Harriman Alaska Exp., Crust., X, 1904, pp. 224–226; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 668–669.—Holmes, Proc. Cal. Acad. Sci. (3), III, 1904, pp. 321–323, pl. xxxvii, figs. 39–42.

Localities.—Tomales Bay, California; Lake Washington, Seattle.

The description of this form is given in the following concise manner:

> Head a little transverse, narrower than the body. Upper antenna not reaching to the extremity of the peduncle of the lower. Flagellum of lower antennæ longer than its peduncle. Body narrow in front, gradually increasing in width toward the tail. Peduncle of caudal appendages more than half the length of the terminal filaments. Length $\frac{6}{25}$ inch.

The description is from a single specimen.

Eight specimens of a species of *Asellus* were collected by the Harriman Alaska Expedition at Lake Washington, Seattle. I have referred them to the above species, being unwilling to describe a new species of *Asellus* from a locality so close to that from which *A. tomalensis* was found, when so little is known about *A. tomalensis*. Some of the specimens were sent to Dr. William E. Ritter for comparison with the type and only specimen of *A. tomalensis* in the collection of the California Academy of Sciences. The result of his comparison is given in the following quotation from his letter:

> About the only difference that I am able to make out is in the fact that the inner ramus of the sixth pleopods (uropods?) of *A. tomalensis* is about half as long as the exopodite, and that neither is armed with a tuft of hairs at the tip. This is the case with the one appendage present, but its mate is gone. It is possible that the hair tuft may have been broken off, but the tips of the rami themselves are perfectly smooth. They show no evidence of having lost anything. The fact, however, that

the general hairiness of the Academy specimen is about the same as that of your specimen makes me suspicious that the tuft referred to has been removed. The antennæ and antennules differ in no essential respect, so far as I can see. The chelipeds of the type specimen I am, unfortunately, unable to find.

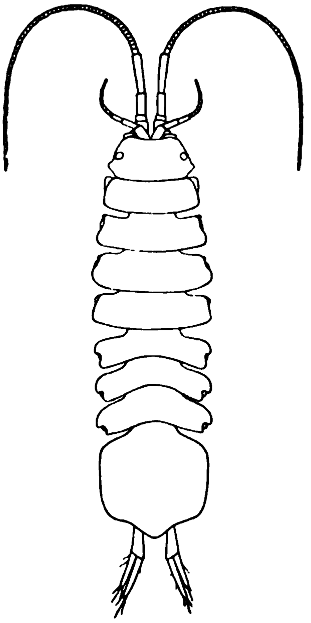

FIG. 487.—ASELLUS TOMALENSIS. × 9.

Description.—Body narrow, elongate, gradually widening somewhat from the anterior to the posterior extremity.

Head but little narrower than the first thoracic segment and about twice as wide as long; frontal margin slightly excavate and without median process between the antennæ; lateral margins straight, with a small lobe on either side near the base of the head. Eyes lateral, situated in the median transverse line. First pair of antennæ reach the extremity of the peduncle of the second pair of antennæ; flagellum consists of about ten joints. Second pair of antennæ are about two-thirds the length of the body; the flagellum consists of about 55 joints.

The first segment of the thorax has the epimeral lobes distinct and visible from a dorsal view at the antero-lateral angles of the segment. In the second and third segments the epimera are bilobed and occupy the anterior portion of the lateral margins. In the fourth segment the epimeron is a small lobe situated at the antero-lateral extremity of the segment. In the fifth and sixth segments the epimeron is a small lobe about the middle of the lateral margin. In the seventh segment it has more of a posterior position on the lateral margin.

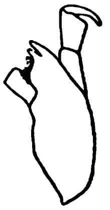

FIG. 488.—ASELLUS TOMALENSIS. MANDIBLE.

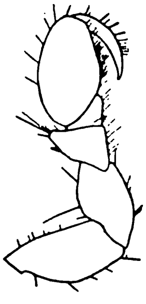

FIG. 489.—ASELLUS TOMALENSIS. LEG OF FIRST PAIR. × 20½.

The abdomen is broad, with the sides nearly parallel. Posteriorly it is produced in the center in a large triangularly shaped lobe with rounded apex. The uropoda are slender appendages; the peduncle is somewhat shorter than the branches. The inner branch is about a fifth longer than the outer branch. The margins of all the segments, the uropods, and the legs are fringed with hairs.

The legs of the first pair are subcheliform; the propodus is elliptical in outline, with the inferior margin straight. The other legs are similar and ambulatory in character.

The color of the species is a light brown, somewhat mottled.

Prof. S. J. Holmes describes the type specimen[a] of this species, which I have not been fortunate enough to obtain for examination. The description given above is from specimens collected at Lake Washington, Seattle, and which I still do not think differ from the type as described by Professor Holmes in any essential characters. The type specimen is imperfect, one uropod being gone and the other with the inner branch partly regenerated. The specimens which Professor Holmes collected at Point Arena have "caudal stylets shorter than the abdomen," as is also true of my specimens, and he considers the Point Arena specimens as young specimens of this species.

A slight difference in the length of the antennæ often occurs among the individuals of a species where the flagellum is multi-articulate. It may be due to a difference in sex or a difference in age.

The only important difference is in the fact that the three last segments of the thorax are entire in the type, as described by Professor Holmes, whereas they are posteriorly notched in the specimens from Lake Washington. The margins of the segments often appear entire when the emargination is filled by the epimeron, so that without having seen the type I would be unwilling to give a new name to the specimens from Lake Washington, which are otherwise in so close agreement with Professor Holmes's description.

69. Genus CÆCIDOTEA Packard.

Body narrow, elongate. Eyes wanting. Head large, not narrower than the first thoracic segment and longer. Terminal segment of body much longer than broad.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CÆCIDOTEA.

a. Propodus of first pair of legs armed with one or more triangular processes.
  b. Propodus of first pair of legs armed with two long triangular processes and three short ones. Uropoda about as long as the terminal segment of the body; the inner branch of the uropoda is two-thirds as long as the peduncle; the outer branch is two-thirds as long as the inner branch .... *Cæcidotea stygia* Packard
  b′. Propodus of first pair of legs armed with a triangular process near the distal end and with a long spine at the proximal extremity. Uropoda shorter than terminal abdominal segment, about one-half its length; the peduncle is as long as the inner branch; the outer branch is one-fourth shorter than the inner branch .... *Cæcidotea nickajackensis* Packard
a′. Propodus of first pair of legs not armed with triangular processes, but edged inside with spines.
  b. First pair of antennæ, with flagellum composed of eleven articles, extend one-third the length of the fifth article of the peduncle of the second antennæ.

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[a] Proc. Cal. Acad. Sci. (3), III, 1904, pp. 321–323.

Second antennæ longer than the body; flagellum composed of about eighty six articles....................................*Cæcidotea richardsonæ* Ha

b'. First pair of antennæ, with flagellum composed of five articles, extend half th length of the peduncle of the second antennæ. Second pair of antenn "probably as long as body;" flagellum is composed of "at least forty seg ments" ....*Cæcidotea smithsii* Ulrich

CÆCIDOTEA STYGIA Packard.

Cæcidotea stygia PACKARD, Amer. Naturalist, V, 1871, p. 752, figs. 132–133.

Cæcidotea microcephala COPE, Amer. Naturalist, VI, 1872, p. 411, fig. 109; 3d an 4th Report Geol. Indiana, 1872, pp. 163, 174–175.—SMITH, Amer. Naturalist VII, 1873, p. 244.

Cæcidotea stygia PACKARD, 5th Report Peabody Acad. Science, 1873, p. 95.—SMITH, Report U. S. Commissioner of Fish and Fisheries, 1874, p. 661.

Asellus stygius FORBES, Bull. Ill. State Lab. Nat. Hist., No. 1, 1876, p. 11.

Cæcidotea stygia HUBBARD, Amer. Entomologist, new series, I, 1880, pp. 36, 79, 80, fig. 10.

Asellus stygius UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.

Cæcidotea stygia RICHARDSON, Amer. Naturalist, XXXIV, 1900, p. 297; Proc. U. S. Nat. Mus., XXIII, 1901, p. 553.

Localities. Graham's Spring, Lexington, Virginia; also Mammoth Cave, Kentucky, and wells in Indiana; Illinois in deep wells; "Richardson's Spring," Mammoth Cave, Kentucky.

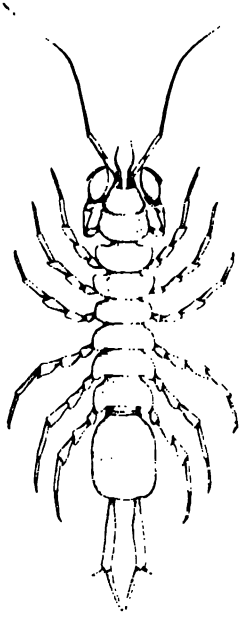

FIG. 490.—CÆCIDOTEA STYGIA (AFTER HAY).

Body narrow, elongate, five times longer than wide, 2 mm.: 10 mm.

Head a little wider than long, 1 mm.: 1½ mm., with the anterior margin slightly excavate. The eyes are absent. The first two articles of the first pair of antennæ are subequal in length, the second one being more slender than the first; the third article is about two-thirds the length of the second. The flagellum is composed of about twelve articles. The first three articles of the second antennæ are short and about equal in length; the fourth is about as long as the first three together; the fifth is one and a half times longer than the fourth. The flagellum is composed of about seventy articles. The maxilliped has a palp of five articles. The palp of the mandibles is composed of three articles.

The segments of the thorax are loosely articulated. The lateral margins of the segments are not contiguous, but are

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[a] The first pair of legs in *Cæcidotea smithsii* are not described in detail; they are simply spoken of as being "subchelate." From the figure, however, they appear to be armed not with triangular processes, but furnished instead with spines on the inferior margin of the propodus.

separated by a deep and wide incision between the segments. The segments are about equal in length. Epimera are present on all the segments. On the first three they are small and narrow plates placed just below the antero-lateral angles. On the fourth segment they occupy the middle of the lateral margin. On the last three segments they are post-laterally placed.

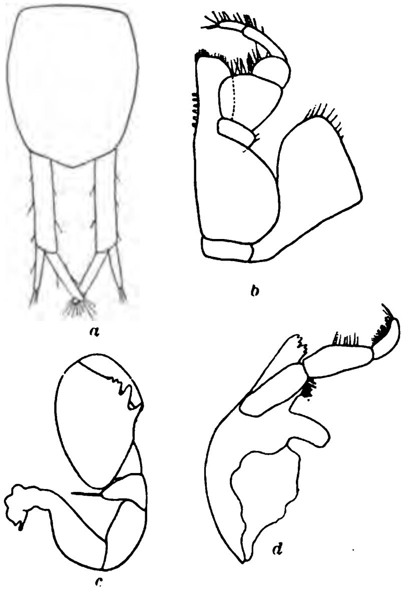

FIG. 491.—CÆCIDOTEA STYGIA. *a*, TERMINAL SEGMENT OF BODY AND UROPODA. × 20½. *b*, MAXILLIPED. × 38½. *c*, FIRST LEG. × 20½. *d*, MANDIBLE. × 38½.

The first two segments of the abdomen are short. The third or terminal segment is narrow, elongate, the posterior margin being almost truncate, the median terminal lobe being broadly rounded and not prominent, almost vanishing. The terminal segment is one and a half times longer than wide, 2 mm.: 3 mm. The uropoda are about as long as the terminal segment. The peduncle is long and narrow and is about two-thirds as long as the terminal segment. The inner branch of the uropoda is two-thirds as long as the peduncle. The outer branch is two-thirds as long as the inner branch. In the female the first pleopoda are attached close together.

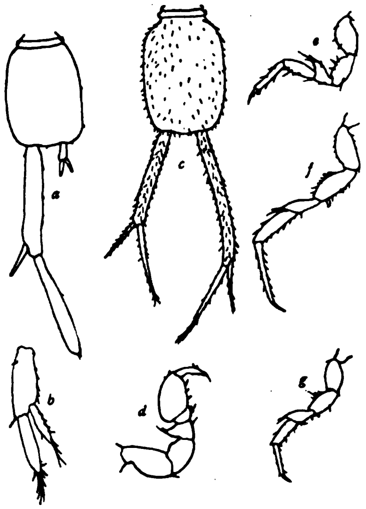

FIG. 492.—(AFTER HAY.) *a*, ABDOMEN AND UROPODA OF CÆCIDOTEA STYGIA (MAMMOTH CAVE). *b*, UROPOD OF CÆCIDOTEA NICKAJACKENSIS (METCALF, GEORGIA). *c*, ABDOMEN AND UROPODA OF CÆCIDOTEA RICHARDSONÆ (NICKAJACK CAVE). *d*, GNATHOPOD OF CÆCIDOTEA NICKAJACKENSIS (METCALF, GEORGIA). *e*, FIFTH LEG OF CÆCIDOTEA NICKAJACKENSIS (METCALF, GEORGIA). *f*, FIFTH LEG OF CÆCIDOTEA RICHARDSONÆ (NICKAJACK CAVE). *g*, FIFTH LEG OF CÆCIDOTEA STYGIA (MAMMOTH CAVE).

The first pair of legs are prehensile, with propodus greatly dilated and armed on the inferior margin with two long triangular processes and three short ones. All the other legs are ambulatory.

CÆCIDOTEA NICKAJACKENSIS Packard.

Cæcidotea nickajackensis Packard, Amer. Naturalist, XV, 1881, p. 879.—Underwood, Bull. State Lab. Nat. Hist., II, 1886, p. 359.—Richardson, Amer. Naturalist, XXXIV, 1900, pp. 297–298.—Hay, Proc. U. S. Nat. Mus., XXV, 1903, pp. 426–429.

Localities.—Tennessee; Metcalf, Georgia.

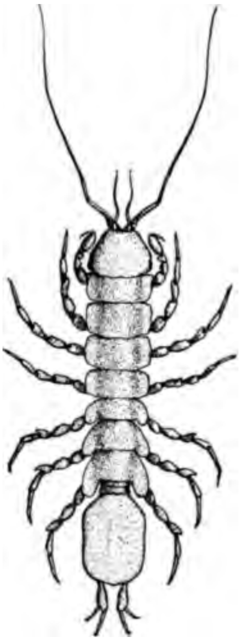

Fig. 493.—Cæcidotea nickajackensis (after Hay). Metcalf, Georgia, specimen.

Body narrow, elongate, about seven times longer than wide, 1 mm. : 7 mm.

Head wider than long, with the anterior margin excavate. Sides of head entire. Eyes absent. First pair of antennæ with the first article about twice as long as broad; second article a little longer than the first; third article one-third the length of the second. The flagellum is composed of nine articles. The second pair of antennæ have the first two articles short and about equal in length; the third is about one-half the length of the second; the fourth is as long as the first three taken together; the fifth is one and a half times as long as the fourth. The flagellum is composed of fifty-three articles, and is 3½ mm. long. The palp of the maxilliped is composed of five articles. The mandible has a palp of three articles.

The first four segments of the thorax are about equal in length. The fifth is a little shorter. The sixth and seventh are about one and a half times longer than the fifth. The first three segments have the epimera present as a very small and almost inconspicuous lobe situated on the anterior part of the lateral margin. The fourth segment has the epimeron situated about the middle of the lateral margin. The last three segments have the epimera posteriorly situated.

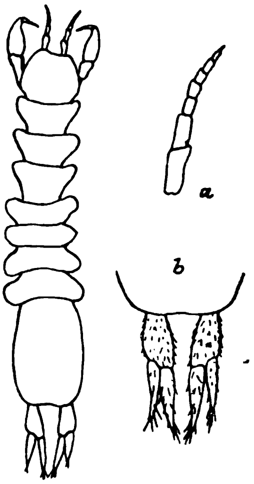

Fig. 494.—Cæcidotea nickajackensis (after Packard). *a*, First antenna. *b*, Uropoda.

The abdomen is composed of three segments; two short ones, subequal in length, anterior to the long, terminal one. The terminal segment is about twice as long as wide, 1 mm. : 2 mm. It is subquadrate in shape, with the post-lateral angles rounded and a very slight indication of a median lobe. The uropoda are shorter than the terminal segment, about one-half its length. The peduncle is about as long as the inner branch. The outer branch is about one-fourth shorter than the inner branch.

The first pair of legs are subchelate. The propodus is armed on the inferior margin with a triangular process near the distal end and with a long spine at the proximal extremity. The dactylus is armed with numerous spines along the inferior margin. All the other legs are ambulatory, with dactyli uni-unguiculate.

CÆCIDOTEA RICHARDSONÆ Hay.

Cæcidotea richardsonæ HAY, Proc. Biol. Soc. Washington, XIV, 1901, pp. 179–180; Proc. U. S. Nat. Mus., XXV, 1903, pp. 424–428.

Locality.—Nickajack Cave, Tennessee.

Body narrow, elongate, four and a half times longer than wide, 2 mm. : 9 mm.

Head a little wider than long, with the anterior margin slightly excavate. Sides of head entire. Eyes wanting. The first pair of antennæ have the first article about twice as long as wide; the second article is as long as the first, but half as wide; the third article is one-third the length of the second; the flagellum is composed of eleven articles and extends one-third the length of the fifth article of the peduncle of the second pair of antennæ. The second pair of antennæ have the first two articles equal in length; the third article is about half the length of the second; the fourth is as long as the first three together; the fifth is one and a half times as long as the fourth. The flagellum is composed of about eighty-six articles. The second antennæ are longer than the body. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

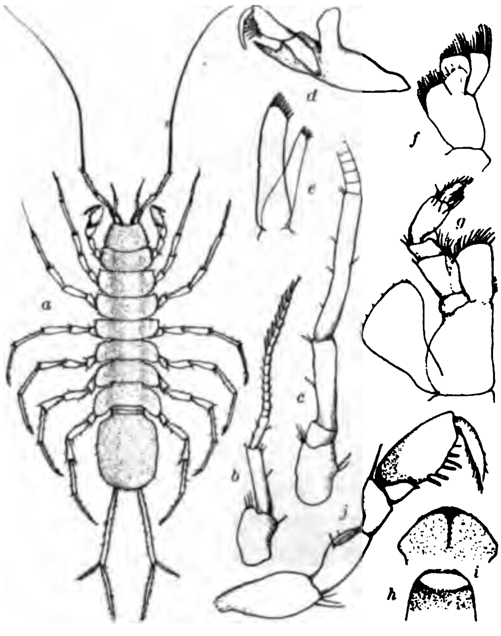

FIG. 495.—CÆCIDOTEA RICHARDSONÆ (AFTER HAY). *a*, DORSAL VIEW. × 6. *b*, FIRST ANTENNA. *c*, SECOND ANTENNA. *d*, MANDIBLE. *e*, FIRST MAXILLA. *f*, SECOND MAXILLA. *g*, MAXILLIPED. *h*, UPPER LIP. *i*, LOWER LIP. *j*, GNATHOPOD.

The first four segments of the thorax are subequal in length. The fifth is a little shorter. The sixth and seventh are subequal and each is a little longer than the fifth. The epimera of the first three segments are small and placed antero-laterally. That of the fourth segment is also small and is placed about the middle of the lateral margin. Those of the last three segments are small and post-laterally placed.

The abdomen is composed of three segments, two short segments anterior to the terminal segment. The terminal segment is 2½ mm. long and 2 mm. wide. Its posterior margin is straight, with the post-lateral angles rounded. The peduncle or basal article of the uropoda is 2½ mm. long, or as long as the terminal segment of the abdomen. The inner branch is 2 mm. long and is twice as long as the outer branch.

The first pair of legs are subchelate. The propodus is armed on the inferior margin with about four long spines. The dactylus is armed with a row of about eleven spines along the inferior margin. All the other legs are ambulatory, with dactyli uni-unguiculate.

CÆCIDOTEA SMITHSII Ulrich.

Cæcidotea smithsii ULRICH, Trans. Am. Microscopical Soc., XXIII, 1902, p. 93, pl. XVI, figs. 10–18.

Locality.—Subterranean stream near San Marcos, Texas; Artesian well at San Marcos, Texas.

"Body of loosely jointed segments. Head as in *C. stygia* Packard.

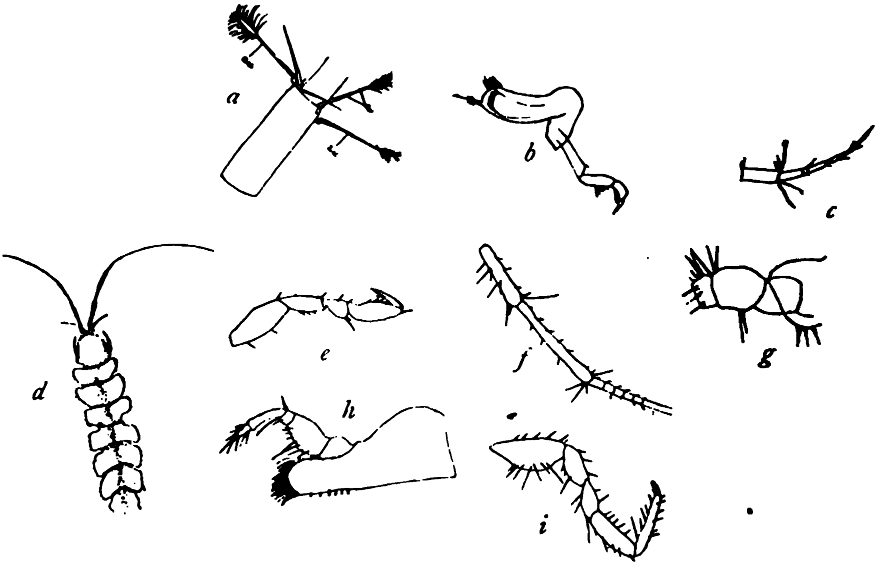

FIG. 196.—CÆCIDOTEA SMITHSII (AFTER ULRICH). *a*, BASAL SEGMENT OF UPPER ANTENNA, SHOWING AUDITORY SPINES. *b*, MAXILLA (?) (ACCORDING TO ULRICH). *c*, UPPER ANTENNA. *d*, PORTION OF BODY. *e*, FIRST LEG. *f*, PORTION OF LOWER ANTENNA. *g*, BASAL PORTION OF SAME. *h*, LABRUM. *i*, SECOND LEG.

No trace of eyes. Inner antennæ short, not more than half as long as basal portion of outer antennæ. Flagellum of inner antennæ consists of five segments, the second one-fourth of first, remaining ones longer. Last segment of flagellum with a spine more than twice length of segment, beside which there is an olfactory club two-thirds as long; another somewhat shorter olfactory club on penultimate segment. Last segment of the basal portion of the inner antennæ provided with three spines, as in *C. stygia.* Outer antennæ probably as long as body. Basal portion of five segments, the first three short and thick, the fourth and fifth much longer and more slender. The flagellum consists of at least forty segments. Mouth parts essentially as those of *C. stygia.* Legs long and slender, first pair subchelate, remaining ones with a weak claw. Inferior margin of the body segments beset with short spines. Size, very small, probably not over 3 mm. in length. Color, white.

"*Habitat.*—Subterranean stream near San Marcos, Texas. Collected by Dr. C. H. Eigenmann, from the U. S. Fish Commission well.

"The above description is from a fragment. The telson and caudal appendages were gone, also part of the outer antennæ. The writer hopes soon to receive the material which will enable him to fill out the gaps in the above diagnosis.

"In honor of Dr. H. M. Smith, in charge of scientific inquiry of the U. S. Fish Commission."—C. J. Ulrich.[a]

Family XVI. STENETRIIDÆ.[b]

Eyes present, large, sub-dorsal. Body depressed, elongate.

First pair of antennæ with flagellum composed of several articles. Second pair of antennæ with multi-articulate flagellum.

Mandibles with palp.

Lateral margins of thorax but little produced, not laciniate. First pair of legs in both sexes subcheliform; following pairs ambulatory, with dactylus bi-unguiculate.

Scale present outside of third joint of peduncle of second antennæ.

First pair of pleopoda in female with appendages fused to form a small operculum. Second pair wanting. Third pair with the outer branches large, and forming, with the corresponding lamella of the opposite side, a sort of operculum. Fourth pair with two branches. Fifth pair consisting of a single branch.

First pair of pleopoda in male small, with the peduncles fused; branches single. Second pair situated below and not coupled with the first pair; branches attached to the distal part of the inner margin of the peduncle; inner branch geniculate, with distal joint narrow and without cavity in its obtuse end; outer branch very short, much shorter than inner one, and unjointed. Third, fourth, and fifth pairs similar to those of female.

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[a] Trans. Amer. Microscopical Soc., 24th annual meeting, 1902, p. 93.

[b] See Hansen for characters of family, Proc. Zool. Soc. London, 1905, II, P p. 315.

70. Genus STENETRIUM Haswell.

Only genus.
With characters of family.

ANALYTICAL KEY[a] TO THE SPECIES OF THE GENUS STENETRIUM.

a. Terminal segment of the body armed on each side with five sharp teeth on the lateral margin. First pair of legs with the upper distal angle of the fifth article produced in a long process .... *Stenetrium serratum* Hansen

a'. Terminal segment of the body with only one tooth at the notch on the lateral margin on each side. First pair of legs with the upper distal angle of the fifth article rectangular, without process.

b. In the male the lower margin of the hand has its proximal half concave, and at the distal end a low broad process, with three or four teeth nearly equal in size placed in a convex line. In the female the angle between the palmar and the lower margin of the hand measures about 110°; the hand is a little more than $\frac{3}{2}$ as long as deep .... *Stenetrium occidentale* Hansen

b'. In the male the lower margin of the hand has its proximal half convex, and at the distal end two processes separated by a rather deep incision; each process terminates in two teeth. In the female the angle between the palmar and the lower margin of the hand measures about 125°; the hand is twice as long as deep .... *Stenetrium stebbingi* Richardson

b''. In the male the lower margin of the hand has its proximal half convex, and at the distal end a narrow, moderately long process, with the end bifurcate, and sometimes besides a feeble tooth on its proximal margin. In the female the angle between the palmar and the lower margin of the hand measures less than 100°, and the hand is a little more than $\frac{3}{2}$ as long as deep.
Stenetrium antillense Hansen

STENETRIUM SERRATUM Hansen.

Stenetrium serratum HANSEN, Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 323–324, pl. XIX, figs. 3a–3d; pl. XX, fig. 1a.

Locality.—St. Thomas, West Indies.

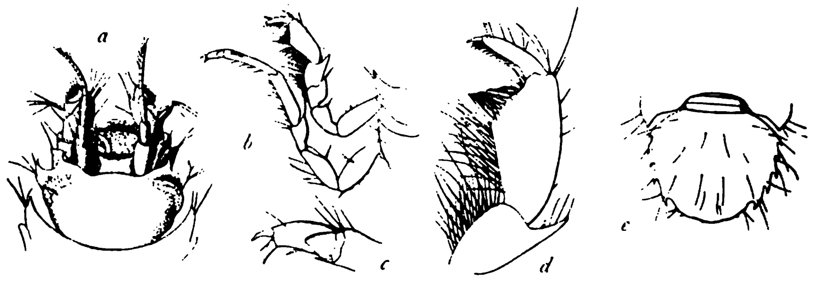

FIG. 497.—STENETRIUM SERRATUM (AFTER HANSEN). *a*, HEAD. *b*, FIRST TWO THORACIC LEGS. *c*, TERMINAL PART OF SECOND LEG. *d*, TERMINAL PART OF FIRST LEG. *e*, ABDOMEN. (ALL ENLARGED.)

"Head has its upper surface (the frontal plate excluded) nearly twice as broad as long; the lateral part is somewhat expanded and flattened in front, and produced into a moderately large acute process; the front margin outside the base of each antennula produced into a rather large process, which is broad at the base, while its distal part is shaped as a narrow, acute hook, curved somewhat inward. Eyes large, oblong, very oblique; the outer margin extremely convex, the inner very concave; their posterior part overlaps the lateral margin of the head itself.

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[a] The key given below is taken from Hansen's Conspectus, given in Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 316–317.

"Antennulæ have the second joint of the peduncle moderately robust and somewhat shorter than the third; flagellum 9-jointed, as long as the sum of the two proximal joints of the peduncle.

"Antennæ have the basal joint, seen from above, distally cut off transversely, its outer angle acute, but not produced into any process.

"First thoracic legs rather short. Third joint distally widened, but without process; fourth joint with the upper part nearly from the base strongly expanded, compressed, and distally produced into a process of moderate length and breadth; fifth joint similarly expanded and distally produced into a long slender process. Hand a little more than twice as long as deep; upper margin rather feebly convex, with a few setæ; lower margin straight, only half as long as the upper, with numerous very long hairs; distal end as long as the lower margin; palmar edge very oblique, a little sinuate, furnished with six very stiff setæ, proportionately long and increasing in length downward, pectinate along their upper margin, and at the end of the edge a moderately robust very long spine pectinate as the setæ; the angle between palmar edge and lower margin measures about 130°. Seventh joint with its claw claw-shaped, reaching a little beyond the lower end of the palmar edge; the joint is adorned below with serrated spines and finely curved setæ as in *S. mediterraneum*, but the spines are less numerous, only about ten.

"Abdominal shield is somewhat broader than long; each lateral margin is adorned with five small nearly spiniform processes, increasing in size backward and placed at regular intervals, the last of these processes being that at the usual notch. Posterior margin is rather evenly but moderately curved.

"Uropoda wanting.

"Length of the single adult female, 6 mm."—HANSEN.[a]

STENETRIUM OCCIDENTALE Hansen.

Stenetrium occidentale HANSEN, Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 324–325, pl. xx, figs. 2a–2n.

Locality.—St. Thomas, West Indies.

"Head shaped as in *S. antillense*; its upper surface (the frontal plate excluded) is considerably less than twice as broad as long; the lateral part, seen from above, is feebly expanded and produced in small acute process; the front margin outside the base of each antennula produced into a broad but rather low process, with the end obtuse. Eyes of moderate length, oblong, somewhat curved, very oblique, and considerably removed from the lateral margin of the head.

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[a] Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 323–324.

"Antennulæ with the second joint slightly longer than the third, moderately robust; flagellum in the male 9-jointed and as long as the sum of the two distal joints of peduncle, in the female still shorter, with four or five joints.

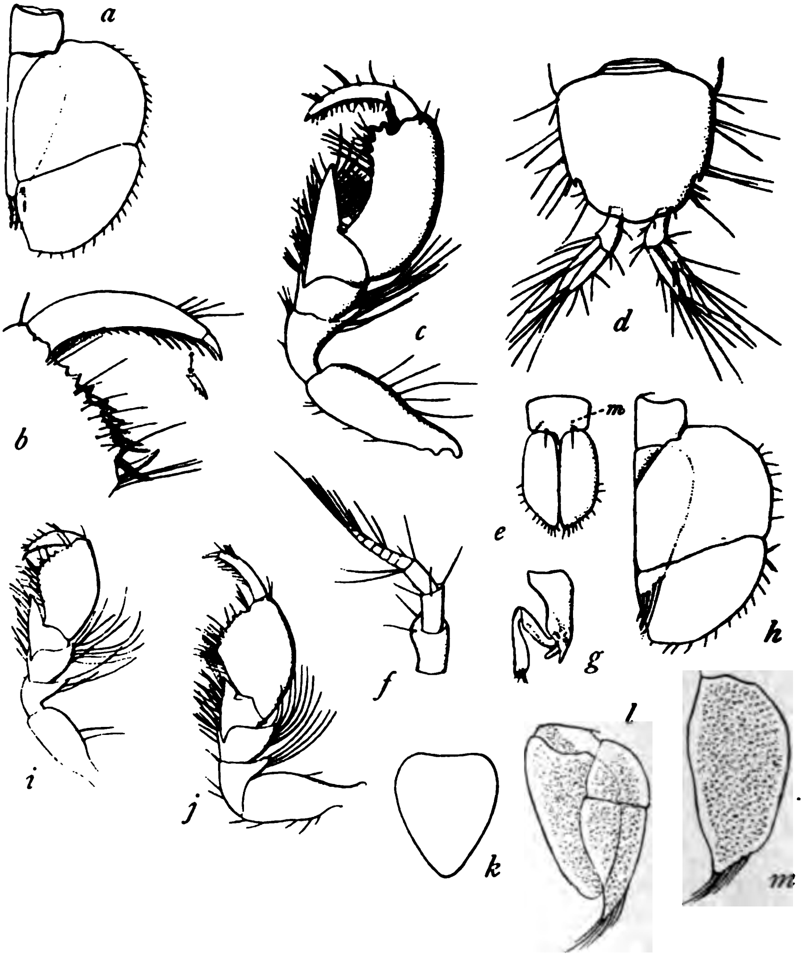

Fig. 498.—Stenetrium occidentale (after Hansen). *a*, Third left pleopod of female. × 51. *b*, Terminal part of first left leg of adult female. × 97. *c*, First leg of adult male. × 39. *d*, Abdomen of female. × 28. *e*, First pleopod of adult male. × 51. *f*, Left antennula of adult male. × 39. *g*, Second left pleopod of adult male. × 51. *h*, Third left pleopod of male. × 51. *i*, First left leg of immature male. × 39. *j*, First left leg of adult female. × 39. *k*, First pair of pleopoda of female. × 51. *l*, Fourth left pleopod of male. × 51. *m*, Fifth left pleopod of male. × 51.

"Antennæ have the basal joint distally cut off transversely, its outer angle without processes and measuring about 90 .

"First thoracic legs very different in adult specimens of the two sexes, but in immature males nearly as in adult females. In the male they are rather long, robust; third joint is distally much expanded above and produced into a triangular process directed upward; fourth joint expands above gradually from the base, forming a broad but rather low process, a portion of the inner surface of which is furnished with numerous exceedingly long hairs. Fifth joint has the upper margin very short, without any process, but it expands below, its lower margin is several times longer than the upper, and besides it is produced into a very long oblong-triangular process, the inner side and both margins of which are closely set with long or very long hairs; the upper margin of the process is straight nearly to the insertion of the hand, and the distance from this insertion to the end of the process is longer than the distance from the insertion to the base of the joint. The hand is very large, a little broader near the end than at the base, two and a half times longer than deep; upper margin strongly convex, lower margin rather concave from the base to the distal process, which occupies the major portion of the short palmar edge; this process is low, broad, its margin more or less convex and divided into three or four teeth; the lower major portion of the inner surface of the hand is closely set with very long hairs. Seventh joint very long, much curved, especially at some distance from the base, claw-shaped, with fine, simple hairs spread along both margins and on the inner side, but without spines; the claw itself is very short. In the female the legs are much shorter than in the male, robust; process on third joint proportionately a little longer and broader, that on fourth joint a little longer than in the male; fifth joint much smaller than in the male, its lower process small. Hand much smaller than in the male, subtriangular, a little more than half as long again as deep; upper margin very convex, two and a half times longer than the lower, which is straight, with many long hairs; distal end somewhat longer than the lower margin; palmar edge feebly convex, with an angular notch at the lower end, so that the usual spine, which is strong and moderately long, is situated a little behind the edge; the edge from the 'claw' to the notch is occupied by five or six saw-teeth gradually increasing in size downward, and besides adorned with some stiff setæ pectinate along their upper margin; finally, the angle between lower margin and palmar edge measures about 110°. Seventh joint with the claw regularly claw-shaped, when extended reaching slightly beyond the notch mentioned; the major portion of the lower margin of the joint is adorned with rather slender spines, serrate along the lower margin, and some fine hairs.

"Abdominal shield slightly broader than long; lateral margin unarmed, only with the usual tooth and notch at the end; posterior margin, reckoned from the notch, is strongly and rather evenly curved.

"Uropoda considerably more than half as long as the abdominal shield; exopod slightly longer than the sympod and much shorter than the endopod.

"Second joint of the endopod of second male pleopoda with the distal half considerably broader than near the base, the end very obliquely rounded, the lower surface at the end set with numerous very short hairs.

"*Length.*—Both sexes similar in this respect, measuring about 3.3 mm."—HANSEN.[a]

STENETRIUM STEBBINGI Richardson.

Stenetrium stebbingi RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 295–296, pl. XXXIX, figs. 46–49.

Localities.—Found at low water in corallines at Bailey Bay, Bermudas, and at Harrington Sound, Bermudas.

Depth.—1 to 12 feet.

Body long, narrow, depressed. Color light yellow, with markings of black.

Head narrowed posteriorly, widening anteriorly; the antero-lateral angles produced into narrow acute processes, curving slightly inward; the anterior margin is produced in a rostrum,[b] which is truncated, on either side of which is a triangular process. Eyes obliquely situated on the anterior portion of the head.

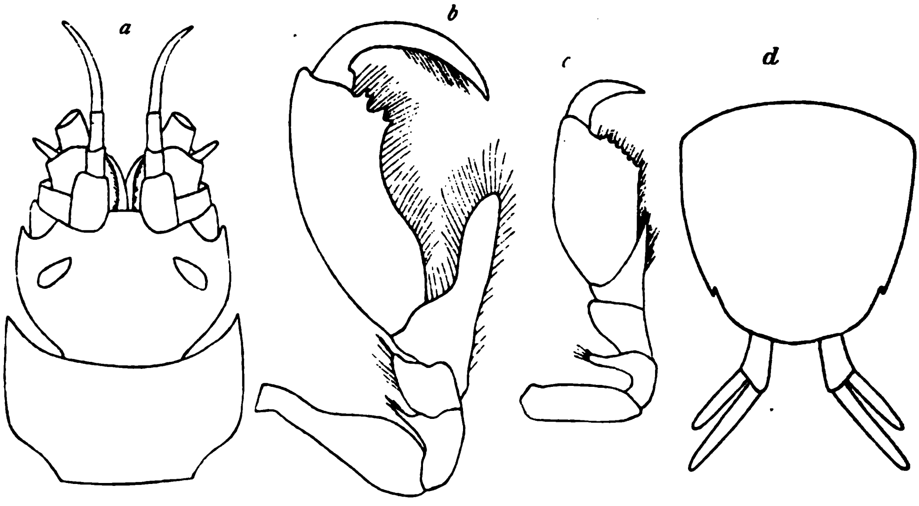

FIG. 499.—STENETRIUM STEBBINGI. *a*, HEAD AND FIRST THORACIC SEGMENTS. *b*, FIRST LEG OF MALE. *c*, FIRST LEG OF FEMALE. *d*, TERMINAL SEGMENT OF BODY AND UROPODA.

The first pair of antennæ are placed between the two triangular processes and the rostrum; the first peduncular joint is large, broad, the two following joints narrow; the flagellum is composed of nine joints and reaches a little beyond the middle of the fourth peduncular joint of the second pair of antennæ.

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[a] Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 324–325.

[b] Hansen calls this the frontal plate.

The second pair of antennæ have the first four joints short, the third joint being provided with an exopod, the fifth and sixth joints long and of equal length; the flagellum is multi-articulate.

The first thoracic segment has the lateral margins straight, the anterior angles acutely produced forward. The lateral margins of the second, third, and fourth segment are also straight, with the epimera evident about the middle.

The fifth and sixth segments have the posterior half of the lateral margin rounded, the epimera evident below. The seventh segment has the lateral margin acutely produced posteriorly, the epimera evident on the posterior margin of the segment within the processes. The thoracic segments are all widely separated from each other by deep lateral incisions.

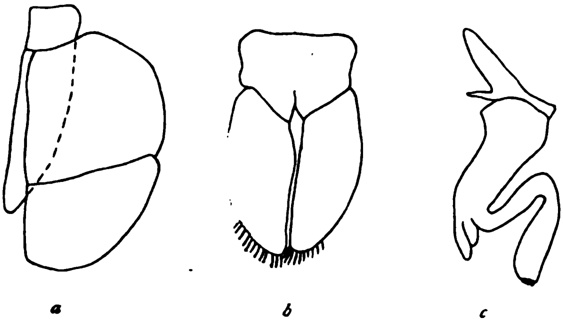

FIG. 500.—STENETRIUM STEBBINGI. *a*, THIRD PLEOPOD OF MALE. × 41. *b*, FIRST PLEOPOD OF MALE. × 77¼. *c*, SECOND PLEOPOD OF MALE. × 77¼.

The terminal segment of the body has the lateral margin produced backward in two small spines, between which the posterior margin is widely rounded. The uropoda are double branched, the branches being nearly equal in length and about as long as the basal joint.

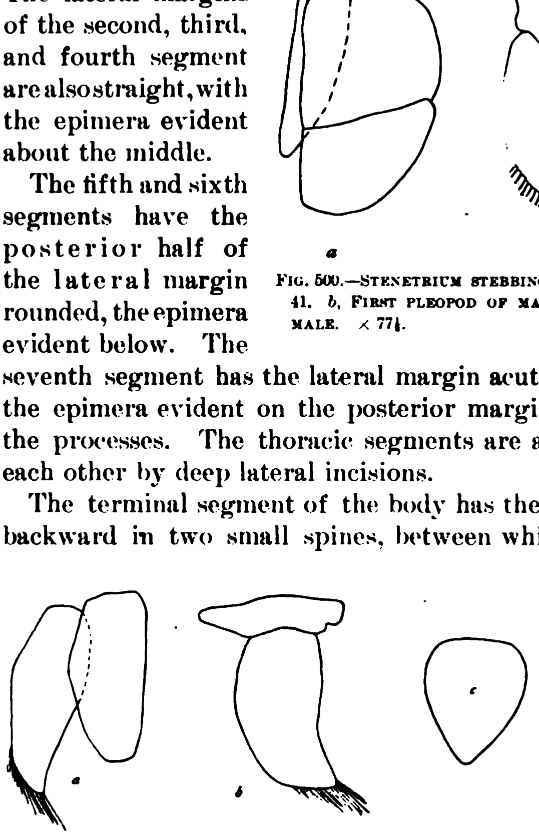

FIG. 501.—STENETRIUM STEBBINGI. *a*, FOURTH PLEOPOD OF MALE. × 41. *b*, FIFTH PLEOPOD OF MALE. × 41. *c*, FIRST PLEOPOD OF FEMALE. × 77¼.

The first pair of legs are subchelate. In the male the carpus is postero-distally produced in a markedly long process, which extends half the length of the propodus, its entire margin being fringed with long hairs. The propodus is elongate, its lower two-thirds being fringed with long hairs on the posterior margin, the upper third or distal margin being provided with three large spines, the inner one being bifurcate; the dactylus is long and also fringed with hairs upon its inner margin, and extends half its length beyond the last digital spine, almost touching the carpal process. The ischium is antero-distally produced in a short process.

The other legs are simple, bi-unguiculate.

In the female the carpus of the first pair of legs is not produced in as long a process as in the male. The propodus is shorter than in the male, more triangular in shape, denticulate on its distal margin, with a long, acute, digital spine. The dactylus does not extend beyond the digital spine. The ischium is antero-distally produced in a process fringed with hairs.

A number of individuals were taken by Prof. A. E. Verrill and party at Bailey Bay, Bermudas, in corallines, at low water, and at Harrington Sound, in 1898. Other specimens were collected at the Bermudas in 1876–77 by Dr. G. B. Goode.

Type specimens from Harrington Sound in Peabody Museum, Yale University. Cat. No. 3209.

This species is named for Rev. T. R. R. Stebbing, the English carcinologist.

STENETRIUM ANTILLENSE Hansen.

Stenetrium antillense Hansen, Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 326–327, pl. xx, figs. 3–3i; pl. xxi, figs. 1a–1e.

Locality.—West Indies. Found on corals in deep water.

"This species is so closely allied to *S. occidentale* and *S. stebbingi* that it is preferable to point out the differences instead of giving a complete description.

"The head is shaped as in *S. occidentale;* the eyes have the same position.

"Antennulæ have second and third joints subequal in length; flagellum in the male about as long as the sum of the two preceding joints, with from nine to eleven joints.

"Antennæ have their basal joints as in *S. occidentale.*

"First thoracic legs show some important differences in their distal half. In the male the fifth joint is below as much produced as in *S. occidentale*, but the process is differently shaped; its proximal half is expanded above and excavated on the upper half of the outer side in order to receive the proximal lower part of the hand; the oblong-triangular, freely protruding part of the process looks therefore much shorter than in *S. occidentale*, in which it is regularly oblong-triangular and quite free to about the articulation of the hand. The hand is deeper than in *S. occidentale* and has a different shape; it is slightly more than twice as long as deep, conspicuously deeper at a shorter distance from the base than at the distal end; the upper margin is less convex than in *S. occidentale*, while the lower margin is considerably convex in its proximal and concave at its distal half; the distal process is longer but much narrower than in *S. occidentale*, bifurcate at the end and sometimes with a feeble tooth on its posterior margin; distribution of hairs as in the species mentioned. The 'claw,' formed by the seventh joint and the claw itself, slightly longer than in *S. occidentale* and more hairy at the lower margin. In the young, probably also in the adult female, the hand differs somewhat in shape from those of the two preceding species: as in *S. occidentale* it is a little more than half as long again as broad, but the lower margin is comparatively longer, measured to the base of the lower sawtooth of the palmar edge

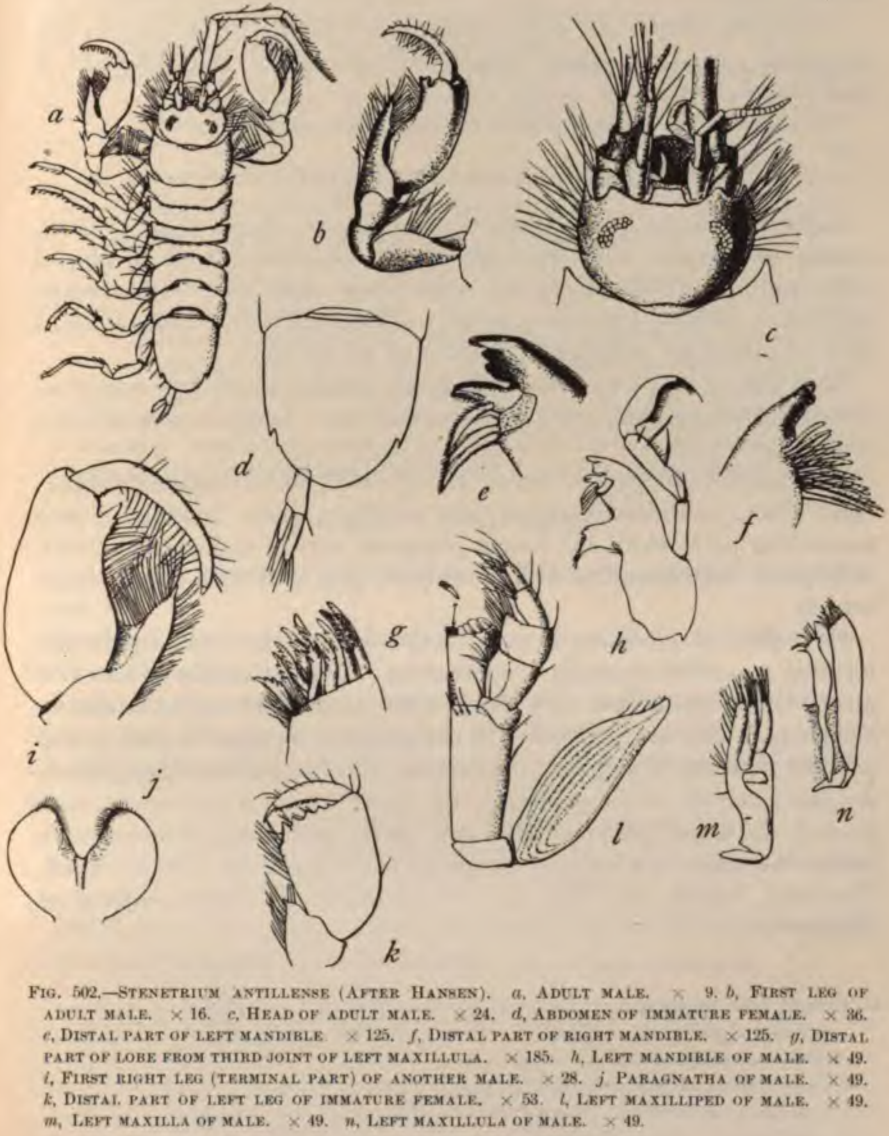

FIG. 502.—STENETRIUM ANTILLENSE (AFTER HANSEN). *a*, ADULT MALE. × 9. *b*, FIRST LEG OF ADULT MALE. × 16. *c*, HEAD OF ADULT MALE. × 24. *d*, ABDOMEN OF IMMATURE FEMALE. × 36. *e*, DISTAL PART OF LEFT MANDIBLE. × 125. *f*, DISTAL PART OF RIGHT MANDIBLE. × 125. *g*, DISTAL PART OF LOBE FROM THIRD JOINT OF LEFT MAXILLULA. × 185. *h*, LEFT MANDIBLE OF MALE. × 49. *i*, FIRST RIGHT LEG (TERMINAL PART) OF ANOTHER MALE. × 28. *j* PARAGNATHA OF MALE. × 49. *k*, DISTAL PART OF LEFT LEG OF IMMATURE FEMALE. × 53. *l*, LEFT MAXILLIPED OF MALE. × 49. *m*, LEFT MAXILLA OF MALE. × 49. *n*, LEFT MAXILLULA OF MALE. × 49.

slightly more than half as long as the upper margin, and the angle between the lower margin and the palmar edge is less than 100°; the notch at the distal end of the lower margin is longer than in *S. occidentale*.

"Abdominal shield is slightly longer than broad, otherwise as in *S. occidentale*.

"Uropoda seem to be only a little more than half as long as the abdominal shield; the rami—preserved only in the young female—a little shorter than in *S. occidentale*.

"Length of the largest male 4.5 mm."—HANSEN.[a]

Family XVII. JANIRIDÆ.[b]

Lateral parts of head lamellarly expanded. Eyes, when present, usually subdorsal. First pair of antennæ sometimes well developed with multi-articulate flagellum, sometimes small with rudimentary flagellum. Second antennæ generally with small scale outside of third joint of peduncle; peduncle composed of six articles.

First pair of legs sometimes prehensile, sometimes not differing from the six following pairs, which are ambulatory; dactylus generally bi- or tri-unguiculate.

First pair of pleopoda in female transformed into a single large opercular plate, undivided; second pair wanting; outer lamellæ of two succeeding pairs, third and fourth pleopoda, narrow and confluent with basal part; both branches well developed; fifth pair with only a single branch.

First pair of pleopoda in male coupled with the second pair and forming a sort of compound operculum. The peduncles of the first pleopoda are fused, are very long, with immovable single branches. Second pair with the distal joint of the peduncle situated outside of and coupled with the first pair of pleopods; the branches are attached to the inner margin of the peduncle; the inner branch is geniculate, two-jointed, the distal joint containing a cavity and being produced to a point; the outer branch is very short, two-jointed, and hook-shaped. The third, fourth, and fifth pairs of pleopoda are similar to those of female.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY JANIRIDÆ.

a. Second pair of antennæ long, well developed, with multi-articulate flagellum; articles of peduncle not dilated. Mandibles with cutting part composed of one or two serrated teeth.

  b. First pair of antennæ extremely small, with rudimentary flagellum, composed of only two articles. Second pair of antennæ without a scale attached to the peduncle. Uropoda extremely small, branches short, nodiform.

Genus *Jæra* Leach

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[a] Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 326–327.

[b] See Sars for characters of family, Crust. of Norway, II, 1899, p. 98, and Hansen, Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 308–309, 315–316.

b′. First pair of antennæ well developed; flagellum multi-articulate. Second pair of antennæ with scale outside of third article of peduncle. Uropoda largely developed.

c. Eyes laterally placed. First pair of legs in male nearly twice the length of the body, enlarged distally, forming a club-like hand armed with triangular processes, to which is articulated a movable finger, the propodus, armed also with triangular processes ....Genus *Carpias* Richardson

c′. Eyes sub-dorsal. First pair of legs in male not twice as long as body; propodus not armed with triangular processes.

d. Maxillipeds with the second and third articles of the palp very much expanded. Distal extremity of the peduncle and the branch of the first pleopoda in the male fused and produced and dilated at the tip. Genus *Janiropsis* G. O. Sars

d′. Maxillipeds with the second and third articles of the palp not expanded. Distal extremity of the peduncle and the branch of the first pleopoda in the male generally not fused nor produced and not dilated at the tip.

e. Terminal segment of body with post-lateral angles produced into a triangular expansion, one on either side. Segments of thorax with lateral parts produced, laciniate.....................Genus *Iolella*, new name.

e′. Terminal segment of body with post-lateral angles not produced in a triangular expansion, one on either side. Segments of thorax with lateral parts not produced, not laciniate.................Genus *Janira* Leach

a′. Second pair of antennæ short, with articles of peduncle dilated; flagellum rudimentary. Second antennæ equal in length to the width of the head. Cutting part of mandibles composed of five teeth.............Genus *Jæropsis* Koehler

71. Genus JÆRA Leach.[a]

Body broad, depressed. Lateral parts of thoracic segments laminarly expanded.

Head without rostrum. Terminal segment with median emargination, within which the uropoda are placed. Eyes dorsal.

First pair of antennæ extremely small, with rudimentary flagellum. Second pair of antennæ long and well developed, without a scale attached to the peduncle of the second antennæ; flagellum multi-articulate.

Uropoda extremely small; branches short, nodiform.

Legs of all seven pairs ambulatory in structure; dactylus triunguiculate.

Distal extremity of the peduncle and the branch of the first pleopoda in the male fused and dilated at the tip.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS JÆRA.

a. Anterior margin of the head broadly excavated on either side of a median lobe. Extremity of terminal segment of body notched for the insertion of the uropoda, the median point being almost imperceptible.........*Jæra marina* (Fabricius)

a′. Anterior margin of the head nearly straight. Extremity of terminal segment of body with a double excavation, the median point not extending beyond the extremity of the sides.........................*Jæra wakishiana* Spence Bate

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 103–104.

JÆRA MARINA (Fabricius.)

Oniscus marinus Fabricius, Faun. Groenland., 1780, p. 252.

Jæra albifrons Leach, Edinburgh Encyclop., VII, 1813–14, p. 434 (Am. ed., p. 273); Trans. Linn. Soc., XI, 1815, p. 373.—Desmarest, Dict. Sci. Nat., XXVIII, 1823, p. 381; Consid. Crust., 1825, p. 316.—Latreille, Règne Anim., IV, 1829, p. 141.—Edwards, Annot. de Lamarck, V, 1838, p. 267; Hist. Nat. des Crust., III, 1840, p. 150.

Jæra kroyeri Zaddach, Syn. Crust. Pruss. Prodromus, 1844, p. 11.

Jæra albifrons Edwards, Règne Anim., Crust., 1849, p. 204.

Jæra baltica Fr. Muller, Arch. Naturg., I, 1848, p. 63, pl. iv, fig. 29.

Jæra albifrons Lilljeborg, Ofvers. vet. Akad. Forh., VIII, 1851, p. 23; IX, 1852, p. 11.

Jæra copiosa Stimpson, Smithsonian Contributions to Knowledge, VI, 1853, p. 40, pl. iii, fig. 29.

Jæra albifrons M. Sars, Christ. Vid. Selsk. Forh., 1859, p. 153.—Bate, Report Brit. Assoc., 1860, p. 225, 1861.—G. O. Sars, Nyt. Magazin for Naturvidenskaberne, 1866, p. 29.

Jæra nivalis Packard, Mem. Bost. Soc. Nat. Hist., I, 1867, p. 296.

Jæra albifrons Norman, Report Brit. Assoc., 1866, p. 197, 1867; 1868, p. 288, 1869.—Bate and Westwood, Brit. Sess. Crust., II, 1868, p. 317, fig.

Jæra albifrons Sars, Christ. Vid. Selsk. Forh., 1871, p. 272, 1872.

Jæra copiosa Verrill, Am. Journ. Sci. (3), VII, 1874, p. 131; Proc. Amer. Assoc., 1873, p. 369, 1874.—Harger with Verrill, Report U. S. Fish Comm., 1873, Pt. 1, p. 315; p. 571.

Jæra albifrons Stebbing, Journ. Linn. Soc. London, XII, 1874, p. 149; Ann. Mag. Nat. Hist. (4), XVII, 1876, p. 79, pl. v, figs. 5–6.—Meinert, Natur. Tidsskr. (3), XI, 1877, p. 80.—Stebbing, Trans. Devon. Assoc., 1879, p. 7.—Harger, Proc. U. S. Nat. Mus., 1879, II, p. 158; Report U. S. Fish Comm., Pt. 6, 1880, pp. 315–318, pl. i, figs. 4–8 (see Harger for synonymy).—Bovallius, Bihang till K. Sv. Vet.-Akad. Handl., XI, 1886, No. 15, pp. 42–44.—Hansen, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 192–193.

Jæra marina Sars, Crust. of Norway, II, 1899, p. 104.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 554.—Paulmier, Bull. New York State Museum, 1905, pp. 178–179.

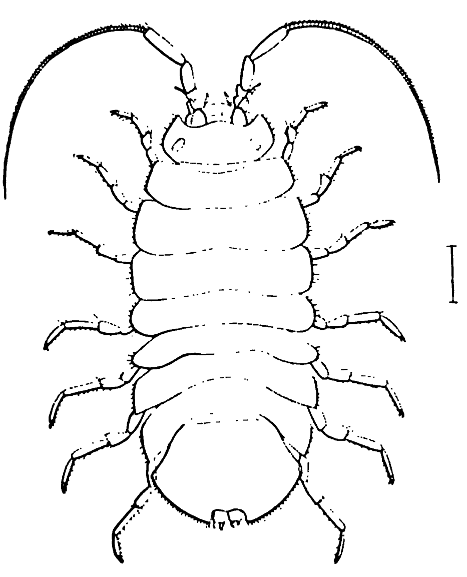

FIG. 503.—JÆRA MARINA (AFTER HARGER). × 10.

Localities.—Atlantic coast of New England; Labrador; Bay of Fundy; also coasts of England, Scotland, and Finmark; Fiskenaesset, Godhavn, and Claushavn, Greenland;

Baltic Sea; North Sea; Germany; west coast of Helgoland; Runmarö, Stockholms skärgård (J. Lindahl).

Depth.—Found on surface in tide pools; low water, under stones.

Body oblong-ovate, twice as long as wide, 1½ mm. :3 mm.

Head about twice as wide as long, with the anterior margin produced in the middle in a large rounded lobe. Lateral margins straight, with the post-lateral angles round, the antero-lateral angles not produced. The eyes are small, oval or round, composite, and dorsally situated. The first pair of antennæ have the first article large; the second and third are about equal in length and a little shorter than the first. The flagellum is composed of two articles. The second pair of antennæ have the first four articles short and subequal; the fifth article is twice as long as the fourth; the sixth is one and a half times longer than the fifth. The flagellum is composed of about eighteen articles. The second antennæ are short, not reaching beyond the posterior margin of the fifth thoracic segment. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

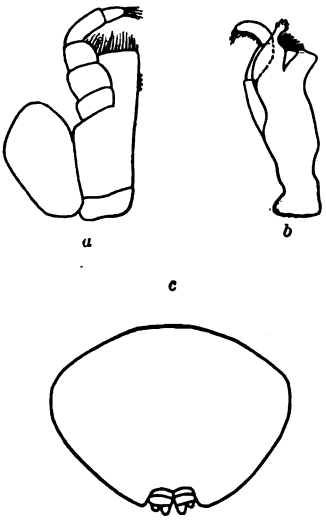

FIG. 504.—JÆRA MARINA. *a*, MAXILLIPED. × 77½. *b*, MANDIBLE. × 77½. *c*, ABDOMEN WITH UROPODA. × 41.

The lateral margins of the thoracic segments are straight and not produced into lobes. The epimera are not separated off from the segments.

The abdomen is composed of a single large segment, rounded posteriorly, with a small median excavation for the reception of the uropoda. The uropoda are short, not extending beyond the extremity of the abdomen, and situated within its posterior excavation. The outer branch is a little smaller and shorter than the inner branch.

All the legs are ambulatory, with tri-unguiculate dactyli.

JÆRA WAKISHIANA Spence Bate.

Jæra wakishiana SPENCE BATE, Lord's Naturalist in British Columbia, II, 1886, p. 282.—C. BOVALLIUS, Bihang till K. Sv. Vet.-Akad. Handl., XI, 1886, No. 15, p. 49.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 857; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 323; American Naturalist, XXXIV, 1900, p. 298.

Locality.—Esquimault Harbor, British Columbia.

"Posteriorem marginem pleonis habens bis excavatum cuspide intermedia supra cuspidatos margines non producta; antennæ inferiores non possunt extendere supra quintum segmentum; pereionis posteriora pleopoda non longiora quam posteriori margo latus est.

"Anterior margin of the cephalon nearly straight; pereion having the sides subparallel, the greatest width being at the sixth segment; pleon having a double excavation on the posterior margin, the central point not extending beyond the extremity of the sides. Superior antennæ reaching to the extremity of the fourth segment of the inferior; inferior antennæ nearly two-thirds of the length of the animal. Posterior pair of pleopoda as long as the posterior margin of the pleon, terminating in two styliform rami, each of which is tipped with a few short hairs.

"This species was taken from a sponge dredged in about eight fathoms of water in Esquimault Harbor.

"The specific name is derived from the circumstance of the animal having been found on the territory of the tribe of Wakish Indians."—SPENCE BATE.[a]

72. Genus CARPIAS Richardson.

Head without rostrum; frontal margin straight. Both pairs of antennæ multi-articulate; the second pair much longer than the body, and with a scale-like appendage articulated to the peduncle. Uropoda long, much longer than abdomen.

The first pair of legs in the male are prehensile and remarkably long, being one and two-thirds times the length of the body; they are greatly enlarged distally, forming a broad club-like hand armed with triangular processes, to which is articulated a movable finger, the propodus, likewise armed with triangular processes.

The ambulatory legs are simple, bi-unguiculate, and are of normal structure.

CARPIAS BERMUDENSIS Richardson.

Carpias bermudensis RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 294–295, pl. XL, fig. 41; pl. XXXIX, figs. 42–45.

Locality.—Bermudas.

Surface of body smooth. Color yellow, with arborescent markings of black.

Head narrower than first thoracic segment, with lateral margins rounded, entire. Frontal margin straight, antero-lateral angles not produced, rounded. Eyes large, with many ocelli, and situated on the lateral margins of the head.

The first pair of antennæ have the basal segment of the peduncle enlarged, the next two segments successively narrower, all about equal in length; the flagellum is multi-articulate, composed of about fourteen joints. The second pair of antennæ have a scale-like appendage outside of the third joint; the fifth and sixth joints are long, the sixth a little longer than the fifth; the flagellum is much longer than the body, and is composed of about one hundred joints.

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[a] Lord's Naturalist in British Columbia, II, 1886, p. 282.

The first thoracic segment is wider than the head; the lateral margins are straight, entire. The second and third segments have the lateral margins excavate, the anterior and posterior angles produced, with the epimeron situated in the excavation. The fourth segment has the anterior angle produced, the epimeron being situated in the excavation of the entire posterior part of the segment. The fifth, sixth, and seventh segments have the lateral margins entire, the epimeron showing at the posterior part of the segment.

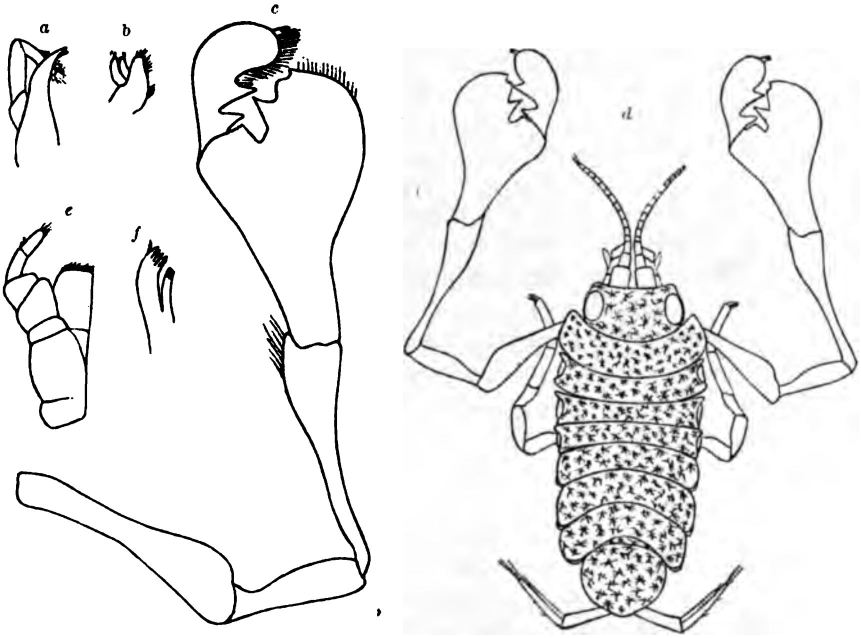

FIG. 505.—*Carpias bermudensis*. *a*, Mandible. × 58. *b*, Second maxilla. × 58. *c*, First leg of male. × 30⅓. *d*, Dorsal view of male. × 18⅜. *e*, Maxilliped. × 58. *f*, First maxilla. × 58.

The terminal segment of the body is about as broad as long, the entire margin smooth, with a small rounded lobe between the basal joints of the uropoda.

The uropoda are very long, much longer than the abdominal segment. The basal joint is about two-thirds the length of the abdominal segment, and is narrower at the base than at the apex. The two branches are of nearly equal length, the outer one being slightly shorter, and they are longer than the basal joint.

The first pair of legs in the male are remarkably long, being one and two-thirds times the length of the body, and are prehensile. The basis is as long as the width of the first thoracic segment, and has the distal end very much enlarged and inflated. The ischium is not more than half the length of the basis. The merus is a little longer than the basis, and is enlarged at its distal end. The carpus is very much elongated, is longer than the ischium, is greatly enlarged distally, and has its upper distal margin armed with three large triangularly-shaped processes. The propodus has the inner surface armed with two long, sharp, triangular processes, its distal end being widely expanded and rounded on the inner surface. The dactylus is bi-unguiculate.

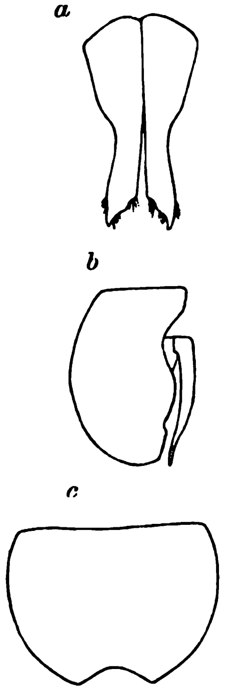

FIG. 506. CARPIAS BERMUDENSIS. *a*. FIRST PLEOPOD OF MALE. × 58. *b*, SECOND PLEOPOD OF MALE. × 58. *c*, FEMALE OPERCULUM. × 58.

The other legs are of normal structure, ambulatory in character, and bi-unguiculate. In the female the first pair of legs are similar in structure and size to the other legs.

A number of individuals were collected by Dr. George Brown Goode at the Bermudas.

Type specimens in Peabody Museum, Yale University. Cat. No. 3203.

73. Genus JANIROPSIS G. O. Sars.[a]

Head without rostrum.

Lateral parts of thoracic segments but slightly expanded, not laciniate. Eyes well developed. First pair of antennæ comparatively small, with the flagellum composed of only a limited number of articles. Second pair of antennæ of moderate length; antennal scale very small, but distinctly defined.

Maxillipeds with the second and third articles of the palp very much expanded, laminar. Distal extremity of the peduncle and the branch of the first pleopoda in the male fused and produced and dilated at the tip.

Uropoda short, about half as long as abdomen.

Legs bi-unguiculate.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS JANIROPSIS.

a. Head with a prominent rounded median lobe on the anterior margin. Terminal segment of body narrowly rounded, and with a small median lobe between the uropoda; no lateral lobes......................*Janiropsis californica* Richardson

a.′ Frontal margin of head nearly straight, without a median lobe. Terminal segment of body posteriorly produced in three lobes, a broadly rounded median lobe and an acute lateral lobe on either side of the median lobe.
Janiropsis kincaidi Richardson

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 102.

JANIROPSIS CALIFORNICA Richardson.

Janiropsis californica RICHARDSON, Harriman Alaska Exp., Crust., X, 1904, pp. 223-224; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 666-667.

Locality.—Sausalito, California.

Body narrow, elongate; surface smooth; color uniformly whitish.

Head with a prominent rounded median lobe on the anterior margin; lateral angulations rounded; lateral margins straight and converging toward the base. Eyes black, distinct, but small, and simple in structure. First pair of antennæ are composed of six joints and extend nearly to the middle of the fifth joint of the peduncle of the second pair of antennæ. Second pair of antennæ are about equal to one-third the length of the body; the flagellum is composed of nineteen or twenty joints.

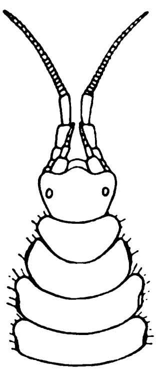

FIG. 507.—JANIROPSIS CALIFORNICA. ANTERIOR PART OF BODY. × 27.

The first thoracic segment is but little wider than the head; the margins are entire, lateral lobes rounded. The second segment has the lateral margin straight, with the epimeron showing slightly along the edge. The third and fourth segments have the antero-lateral lobe rounded, the posterior margin straight, with the epimeron showing as a rounded lobe. The fifth, sixth, and seventh segments have rounded lateral margins, with epimera showing on the posterior part of the segments.

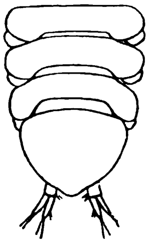

FIG. 508.—JANIROPSIS CALIFORNICA. TERMINAL PART OF BODY. × 27.

Terminal segment rounded posteriorly with smooth margins, and a median lobe between the uropoda.

Uropoda very short, about half as long as the terminal segment. Branches about equal in length and twice as long as the peduncle.

Legs simple, ambulatory, similar in shape and size, and bi-unguiculate.

Only two good specimens, both females, were taken at Sausalito, California, by Doctor Ritter and party. Two imperfect specimens also are from the same locality.

Until now the only other known species of this genus was *Janiropsis breviremus* Sars.[a] As that author has pointed out, this genus differs from *Janira*, to which it is very closely related, in the much shorter uropoda; in the shorter second pair of antennæ; in the structure of the first pair of antennæ, which have the flagellum composed of only a restricted number of articulations; in the structure of the first pair of legs in the male, these being "remarkably developed, prehensile, much longer than any of the other pairs, with the carpal joint fusiformly dilated;" in the female, however, this pair does not differ from the other legs, all being ambulatory in character.

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[a] Crustacea of Norway, II, 1899, p. 98.

JANIROPSIS KINCAIDI Richardson.

Janiropsis kincaidi Richardson, Harriman Alaska Exp., Crust., X, **1904**, pp. 221-222; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 665-667.

Locality.—Yakutat, Alaska.

Color of body light brown, profusely and densely covered with black markings.

Head wider than long; frontal margin nearly straight, with lateral angles rounded. Eyes large, black, situated some little distance from the lateral margin. First pair of antennæ short; flagellum consisting of only eight joints in the female, of ten in the male. Second pair of antennæ lost in all the specimens. Maxillipeds with palp consisting of five joints, the first three of which are very much dilated.

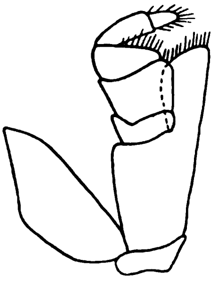

Fig. 509.—Janiropsis kincaidi. Maxilliped. × 77.

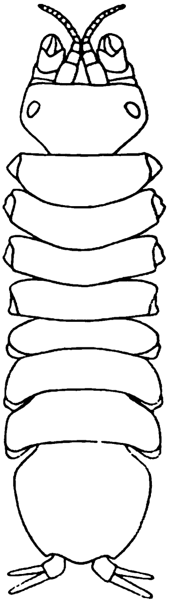

Fig. 510.—Janiropsis kincaidi. × 20½.

The first segment of the thorax has the lateral margins straight; the epimera are rather bilobed, and occupy most of the lateral margin of the segment. The second, third, fourth, and fifth segments have the antero-lateral angles produced into rounded lobes. The epimera of the second and third segments are situated about the middle of the lateral margin; those of the fourth and fifth segments occupy more of a posterior position on the lateral margin. The epimera of the last two segments are situated at the post-lateral angles of the segments.

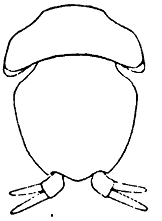

Fig. 511.—Janiropsis kincaidi. Last thoracic segment, abdomen, and uropoda. × 20½.

The abdomen is broad, gradually becoming somewhat narrower toward the posterior extremity. The posterior margin is produced in three lobes, two lateral lobes, one on either side of a broadly rounded median lobe; the two lateral lobes are acute. The uropoda are short, not longer than half the length of the terminal segment of the body; the basal segment is broad, quadrate in shape, and shorter than either branch; the inner branch is somewhat longer than the outer one. The first pleopoda in the male are very similar to the figure given by Sars[a] of the first pleopoda in the type species of the genus, *Janiropsis breviremus*. The distal extremity of the peduncle and the branch are produced and fused.

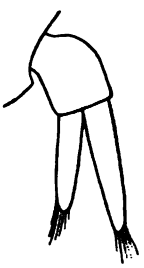

Fig. 512.—Janiropsis kincaidi. Uropod. × 77.

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[a] Crustacea of Norway, II, 1899, p. 102.

Nine specimens were obtained by the Harriman Expedition at Yakutat, Alaska. They were collected by Mr. T. Kincaid, after whom the species is named. Five females and four males were collected. The legs of the first pair in the male are not greatly longer than the others; they are longer in the type species of *Janiropsis*. The very short superior antennæ with few articulations, the greatly dilated joints of the maxillipeds, the form and shape of the peduncle of the first pleopoda in the male, which has the distal extremity fused with the branch and produced and dilated at the tip, and the shortness of the uropoda, which are only half the length of the terminal segment of the body, are characters which undoubtedly place this species with *Janropsis* Sars.

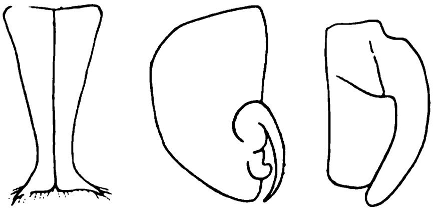

Fig. 513.—Janiropsis kincaidi. *a*, First pleopod of male. *b*, Second pleopod of male. *c*, Third pleopod of male. All × 41.

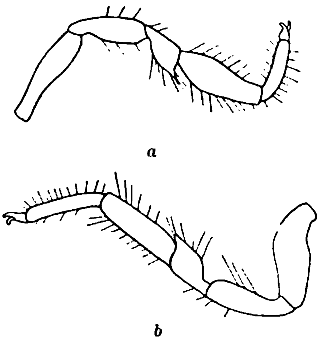

Fig. 514.—Janiropsis kincaidi. *a*, Leg of first pair. × 27. *b*, Leg of second pair. × 27.

Type.—Cat. No. 28,717, U.S.N.M.

74. Genus IOLELLA, new name.[a]

Head usually with prominent rostral projection.

Lateral parts of head usually produced into very prominent, acute lappets.

Segments of thorax with the lateral parts laciniate and produced.

Terminal segment of body forming posteriorly on each side a triangular expansion.

Other characters as in *Janira*.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS IOLELLA.

a. Segments of thorax with spines or tubercles on the dorsal surface.

b. Rostrum as long as head. Flagellum of first pair of antennæ composed of twelve articles, shorter than the breadth of the head. Flagellum of second pair of antennæ composed of fifty articles. First thoracic segment shorter than the second. Second and third segments equal, and longest, much longer than the seventh. Terminal segment smooth on dorsal side, without spine-like tubercle. Peduncles of uropoda longer than post-lateral angulations of terminal segment .... *Iolella spinosa* (Harger)

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[a] In a recent letter, Doctor Ortmann informed me that *Tole* was a typographical error for *Iole*, and asked me to correct the mistake in this paper. As *Iole*, howe is preoccupied, having been proposed by Pascoe (Trans. Ent. Soc. London, series, IV, 1858, p. 254) for a genus of Coleoptera, I suggest the new name, *I* In Marshall and Scudder, instead of I, J has been used for *Iole*, although I is in the original reference. (See Sars for characters of genus, Crust. of Norway, 1899, pp. 100–101.)

b′. Rostrum much longer than head. Flagellum of first pair of antennæ composed of sixty to seventy articles, nearly as long as the breadth of the head. Flagellum of second pair of antennæ composed of two hundred and eighty articles. First thoracic segment as long as second. Seventh segment longest. Terminal segment of body, with a single spine-like tubercle on its dorsal side. Peduncle of uropoda shorter than post-lateral angulations of terminal segment of body.................................*Iolella speciosa* (Bovallius)

a′. Segments of thorax smooth on the dorsal surface.

b. Head with prominent rostrum.

c. Lateral margins of head produced into two angulations. Terminal segment of body with central and post-lateral lobes acute, triangular.
Iolella triangulata (Richardson)

c′. Lateral margins of head produced in one angulation. Terminal segment of body with central and post-lateral lobes rounded.

d. Lateral angulations of head long, about as long as rostrum. Median lobe of pleon about as wide and long as post-lateral lobes.
Iolella libbeyi (Ortmann)

d′. Lateral angulations of head short, much shorter than rostrum. Median lobe of pleon much narrower and shorter than post-lateral lobes.
Iolella alascensis Benedict, new species

b′. Head without rostrum, in place of which is small median point.

c. Antero-lateral angles of head acutely produced. Sides of head not produced. Epimera of second, third, and fourth segments of thorax consisting each of a single lobe. Terminal segment of body with post-lateral angles rounded.
Iolella erostrata (Richardson)

c′. Antero-lateral angles of head not produced. Sides of head produced. Epimera of second, third, and fourth segments of thorax bifurcate. Terminal segment of body with post-lateral angles acute.

d. Sides of head produced in a bifurcate process. Terminal segment of body with one large median lobe between the post-lateral angles.
Iolella holmesi (Richardson)

d′. Sides of head produced in an anterior lobe bearing three spines and a small, inconspicuous lobe armed with three feeble spines. Terminal segment of body with three small lobes between the post-lateral angles.
Iolella sarsi, new species

IOLELLA SPINOSA (Harger).

Janira spinosa HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 158; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 323–324.

Ianthe spinosa BOVALLIUS, Bihang till Kgl. Sv. Vet. Akad. Handl., XI, 1886, No. 15, p. 34.

Janira spinosa HANSEN (part), Vid. Medd. naturh. Foren. i Kjøbh., 1887–88, p. 191.

Ianthe spinosa RICHARDSON, Amer. Naturalist, XXXIV, 1900, p. 299; Proc. U. S. Nat. Mus., XXIII, 1901, p. 555.

Localities.—Banquereau; latitude 65° 35′ north, longitude 54° 50′ west; latitude 66° 32′ north, longitude 55° 34′ west; latitude 67° 59′ north, longitude 56° 33′ west.

Depth.—80 to 100 fathoms.

"This species is well marked among our known Isopoda by the double row of spines along the back and the acute laciniations or angulations on the lateral margins of the thoracic segments.

"The body is robust, the length but little exceeding twice the breadth. The head is broad and produced in the median line into a prominent, acute spine, or rostrum, about as long as the head. The antero-lateral angles are also produced and very acute, but do not extend as far as the rostrum. The eyes are rounded, semi-oval, with the long axes converging toward a point near the base of the rostrum. The basal segment of the antennulæ is less than one-third the length of the rostrum. The second segment is about as long as the first, but of only about half its diameter. The flagellum equals, or slightly surpasses, the third antennal segment, and consists of about twelve segments. The scale or spine on the second segment of the antennæ is slender and considerably surpasses the third segment. The external lamella of the maxillipeds has the outer angle prominent, though not acute.

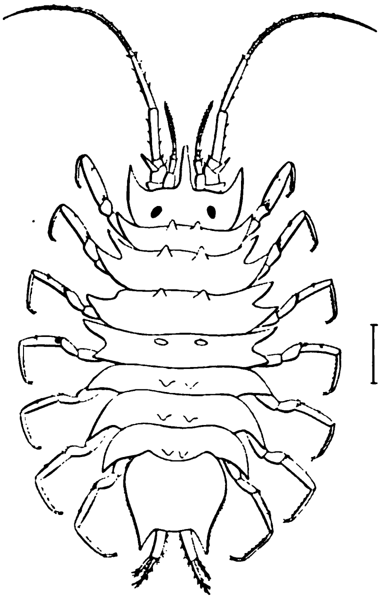

FIG. 515.—IOLELLA SPINOSA (AFTER HARGER). × 6.

"The thoracic segments are produced laterally into one or two acute angulations, giving a sharply serrated or dentated outline to the thoracic region. The first segment is shorter than the second; the second, third, and fourth are about equal in length; the fifth is about the length of the first; the sixth and seventh each a little longer. The first segment is acutely produced at the sides, around the sides of the head, and bears, near the middle of the anterior margin, two short spines, situated about half as far apart as are the eyes, and directed upward and somewhat forward. The second segment has both lateral angles produced into triangular, acute processes, of which the anterior is more slender than the posterior and directed more strongly forward. The dorsal spines on this segment are a little farther apart and larger than in the first segment. In the third segment the lateral angulations are more nearly equal than in the second segment and directed less strongly forward. In the specimen figured the third segment bears, on the left side, a single broad angulation, apparently representing the posterior, while the anterior is only indicated by a slight irregularity in the outline.

"Malformations of this kind appear to be common. The do spines on the third segment are much as in the second. On the fo segment the anterior angulation is longer than the posterior, and b are directed nearly outward. The dorsal spines on the fourth segme are slightly smaller and nearer together than on the third; but, as in all the preceding segments, they are near the anterior border of the segment. The last three segments are acutely produced at the sides into a single angulation, which is directed more and more backward to the last segment. The dorsal spines on the fifth segment are situated nearer together than on the anterior segments and rather behind the middle of the segment. They are also smaller than on the preceding segments. On the last two segments they are near the posterior border of the segment, and become somewhat smaller and nearer together on the last segment. The legs are armed with but few and rather weak spines.

"The pleon is broadest near the base and tapers posteriorly, where the angles are acutely produced. Between these angles the margin is rounded and arched over the bases of the uropods, which are about as long as the pleon and less spiny than in *J. alta*. The lateral margin of the pleon is armed with very minute acute spinules, and under a higher power the margins of the thoracic segments and of the head are seen to be similarly armed, especially where most exposed.

"Length 8 mm., breadth 3.8 mm.; color in alcohol white."—Oscar Harger.[a]

IOLELLA SPECIOSA[b] (Bovallius).

Janthe speciosa Bovallius, Bihang till K. Sv. Vet. Akad. Handl., VI, 1881, No. 4, pp. 5–14, pls. I–III; XI, No. 15, 1886, p. 35.—Richardson, American Naturalist, XXXIV, 1900, p. 299; Proc. U. S. Nat. Mus., XXIII, 1901, p. 555.

Locality.—Baffin Bay.

"The rostrum is much longer than the head (7:5); the lateral angulations of the head are directed obliquely forward; they are longer than the head. The eyes are oval. The long diameter of the eyes equals a sixth of the length of the head. The flagellum of the first pair of antennæ is 60–70 articulated. The first pair of antennæ are nearly as long as the breadth of the head (18:19). The flagellum of the second pair of antennæ consists of almost 280 articuli. The first segment of the pereion is as long as the second; the seventh segment is the longest. All carry each two spine-like tubercles on the dorsal side. The lateral margins of the first segment carry one angulation on each side; the second, third, and fourth two, more or less equal; the fifth, sixth, and seventh, one large and one very minute each. The pleon carries on its dorsal-side a single spine-like tubercle, and is produced backward into two flattened, sharp-pointed angulations; between these the uropoda are attached. The peduncles of the uropoda are

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[a] Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 323–324.

[b] This species is considered by Hansen and Ortmann to be a synonym of the preceding species. Since my manuscript went to press, the types of *I. spinosa* have been sent from Yale University, and I find it distinct from *I. speciosa*.

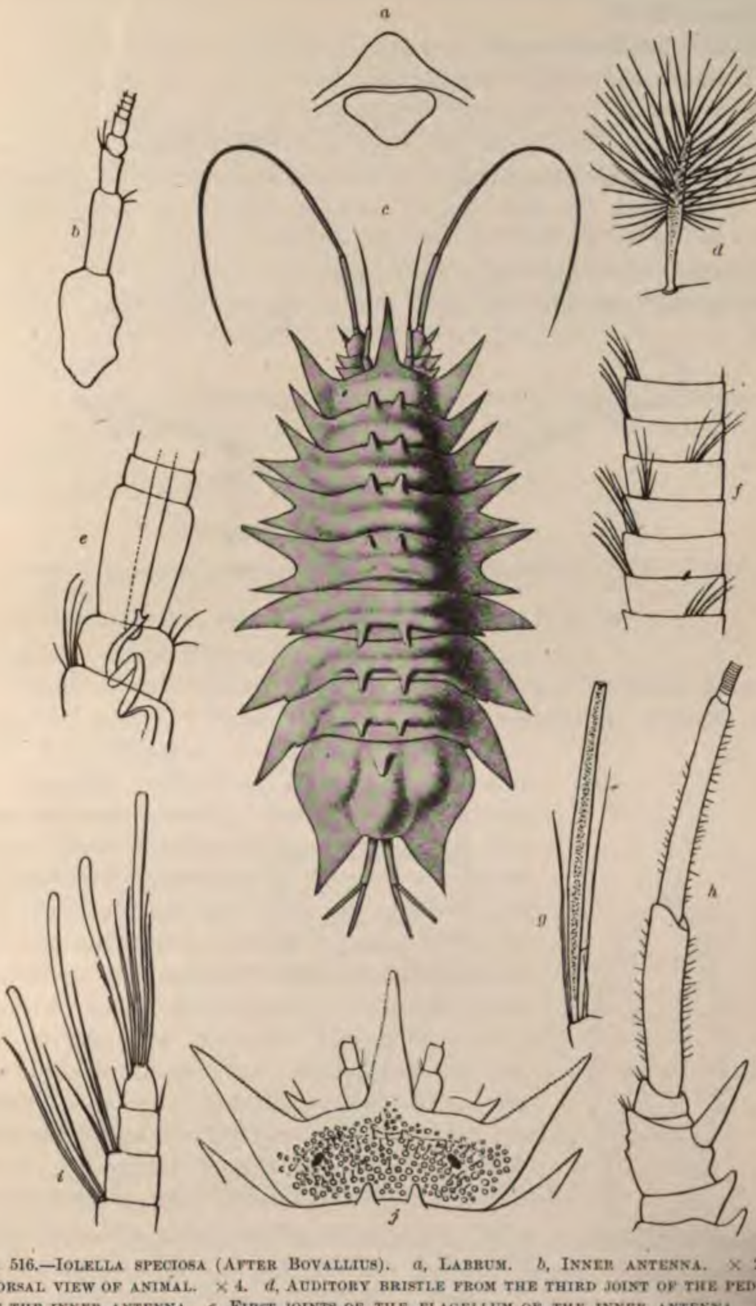

FIG. 516.—IOLELLA SPECIOSA (AFTER BOVALLIUS). *a*, LABRUM. *b*, INNER ANTENNA. × 20. *c*, DORSAL VIEW OF ANIMAL. × 4. *d*, AUDITORY BRISTLE FROM THE THIRD JOINT OF THE PEDUNCLE OF THE INNER ANTENNA. *e*, FIRST JOINTS OF THE FLAGELLUM OF THE INNER ANTENNA. × 1 *f*, SOME ARTICLES OF THE FLAGELLUM OF THE OUTER ANTENNA. × 60. *g*, AN OLFACTORY GLAND SAME. × 260. *h*, PEDUNCLE OF OUTER ANTENNA. × 15. *i*, THE LAST JOINTS OF SAME. × 2 *j*, HEAD. × 10.

shorter than the angulations. The outer ramus is almost as long as the inner (37: 39).

"Color, yellowish white.

"Length, 21.5 mm." —BOVALLIUS.[a]

IOLELLA TRIANGULATA (Richardson).

Ianthe triangulata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 857–858; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 323–324; American Naturalist, XXXIV, 1900, p. 299.

Locality.—Monterey Bay, California.

Surface of body smooth; color yellow, marked with black dots.

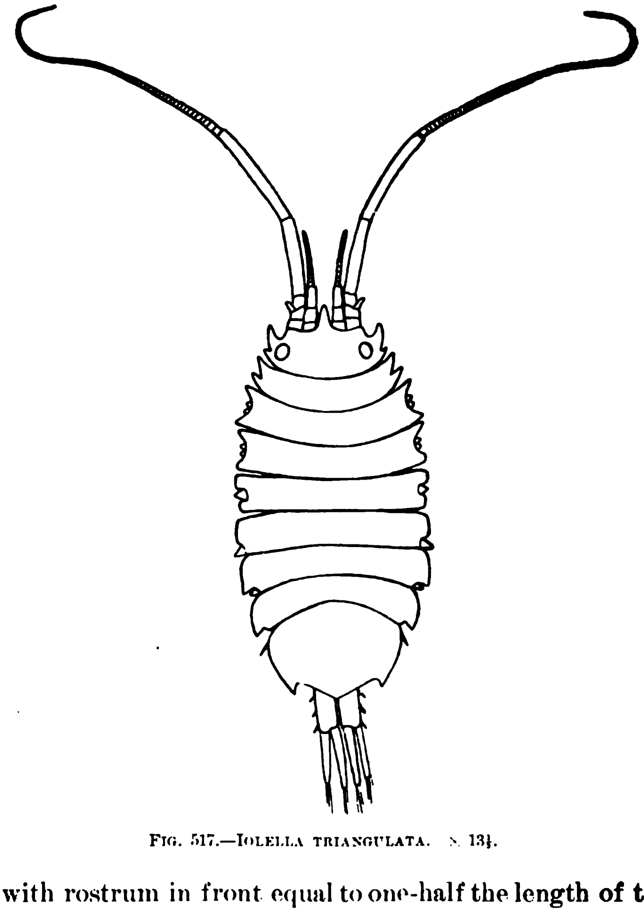

FIG. 517.—IOLELLA TRIANGULATA. × 13½.

Head with rostrum in front equal to one-half the length of the head. Anterior margin lobate between the rostrum and the lateral angulations. The side of the head is produced in two angulations, the upper one extending in an oblique direction and not reaching beyond the anterior margin of the head. The first pair of antennæ are not as long as the width of the head. The second pair of antennæ are longer than the body.

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[a] Bihang till K. Sv. Vet. Akad. Handl., XI, No. 15, 1886, p. 35.

The lateral margins of the first segment are produced on either side into two angulations; those of the second and third into two, with the epimera produced into two-lobed angulations; those of the fourth into two lobes, the small epimeral lobe or angulation between; and those of the fifth, sixth, and seventh into one large upper lobe and one small lower lobe.

The terminal segment is produced backward at the sides into two sharply pointed angulations, with a broad triangulate central lobe between. The uropoda are longer than the terminal segment, the outer branch being somewhat shorter than the inner one, and both fringed with hairs.

The first pair of legs are prehensile; the remaining pairs simple.

Two specimens were collected by Mr. Heath at Monterey Bay, California.

Type.—Cat. No. 22582, U.S.N.M.

IOLELLA LIBBEYI (Ortmann).

Jolanthe libbeyi ORTMANN, Princeton University Bulletin, XI, No. 3, 1900, pp. 39–40.

Tole libbeyi ORTMANN, Proc. Acad. Nat. Sci. Phila., 1901, p. 157.

Locality.—Cape Alexander, North Greenland.

"Length of body 8 mm. Rostrum about as long as the head, directed obliquely upward. Head with one lateral angulation, directed forward. Eyes elliptical. Segments of pereion dorsally smooth, without any spines or tubercles. First segment laterally with two angulations, both of them directed obliquely forward. Second and third segments with four short angulations, the anterior and posterior subequal, the third the smallest. Fourth segment with two angulations, the anterior directed forward, the posterior smaller and directed a little backward. Fifth, sixth, and seventh segments with a large anterior and very small posterior angulation. All the angulations of these segments are comparatively short. Pleon with two bluntly triangular angulations on either side of a bluntly triangular central portion. Uropods about as long as pleon, styliform, outer branch a little shorter than inner. Flagellum of first antenna fifteen articulate; flagellum of second antenna with more than one hundred and fifty annulations.

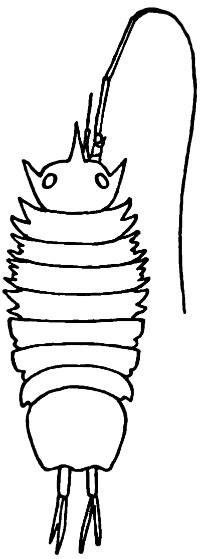
FIG. 518.—IOLELLA LIBBEYI (AFTER ORTMANN). × 6.

"In the wanting tubercles of the dorsal surface and the form of the lateral angulations this species is related to the two species of the genus known from the North Pacific, and the form of the pleon recalls that of *I. erostrata* Richardson (Aleutian Islands). But it differs (1) in the presence of a long rostrum, (2) in the stronger development of the lateral angulations of the head, (3) in the slightly different angulations of the second and third segments of the pereion."—ORTMANN.[a]

IOLELLA ALASCENSIS Benedict, new species.[b]

The head is much broader than long; the rostral projection is nearly as long as the head itself. The rostrum is broad at the base, but narrow and tapering throughout the greater part of its length; the apex is rounded. The sides of the head are laterally expanded and produced forward beyond the line of the front; the lateral projections are accentuated by a deep concavity occupying the outer half of the front. The antennæ are both broken and lost from the distal end of the third article of the peduncles.

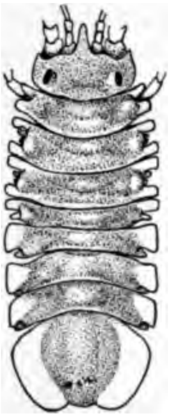

FIG. 519c.—IOLELLA ALASCENSIS.

The first segment of the thorax is strongly produced at its posterior half; the anterior half is diagonal and emarginate. The epimeron is large and produced and placed at the anterior part of the segment. The second and third segments are strongly produced at both angles with a nearly straight margin between the projections. The epimera are bifurcate and placed between the anterior and posterior projections. The fourth, fifth, sixth, and seventh are produced at the anterior angles only, the produced portions becoming successively wider. The epimera are placed at the posterior angles.

The pleon consists of a single segment made up of three longitudinal lobes; the middle lobe is much narrower and shorter than the outer ones; all are rounded at the distal extremity.

The anterior feet are as in the genus, but the propodus is wide, with the basal half of the prehensile edge finely serrate.

From the line of the eyes to the end of the pleon the specimen is sparsely ornamented with very small rounded black spots.

Described from a single specimen taken by Captain Healy, of the U. S. revenue steamer *Corwin*, latitude 71.02 north, longitude 157.46 west, in 19 fathoms.

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[a] Proc. Acad. Nat. Sci. Phila., LIII, Pt. 1, 1901, pp. 157–158.

[b] The following description is from Doctor Benedict's manuscript, which he has very kindly permitted me to publish at this time.

[c] Fig. 519 is through the courtesy of Dr. J. E. Benedict.

IOLELLA EROSTRATA (Richardson).

Ianthe erostrata Richardson, Proc. U. S. Nat. Mus., XXI, 1899, pp. 858–859; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 325; American Naturalist, XXXIV, 1900, p. 299.

Locality.—Chichagof Harbor, Attu (the Aleutian Islands), Alaska.

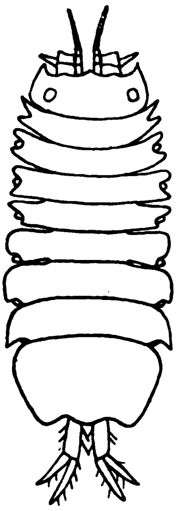

Fig. 520.—Iolella erostrata. × 13½.

Head two and a half times broader than long, with prominent antero-lateral angulations. Lateral margins produced, entire. In place of the rostrum, which marks many of the known species of this genus, there is a small median point. The eyes are dorsally situated a short distance from the lateral edges. The first pair of antennæ are short, not equal to the width of the head. The second pair are broken in the only specimen.

The first thoracic segment is produced laterally in two angulations. The second, third, and fourth segments are each produced in two angulations, with a small epimeral lobe in between. The fifth, sixth, and seventh segments have each a large anterior lobe and a small posterior epimeral lobe.

The terminal segment has two bluntly triangular angulations, one on either side of a bluntly triangular central portion. The uropoda are about as long as the caudal segment, are styliform, with branches nearly equal. The distal extremity of the peduncle and the branch of the first pleopoda of the male are fused and produced at the tip, as in *Janiropsis* Sars. The first pair of legs are prehensile. The others are simple, bi-unguiculate. One specimen, a male, was collected at Chichagof Harbor, Attu (Aleutian Islands), by Dr. W. H. Dall.

Type.—Cat. No. 22610, U.S.N.M.

IOLELLA HOLMESI (Richardson).

Tole holmesi Richardson, Bull. U. S. Fish Comm., XXIV, 1905, pp. 216–217.

Localities.—Stephens Passage, southeastern Alaska; vicinity of Naha Bay, Behm Canal, southeastern Alaska.

Depth.—41 to 188 fathoms.

Body yellow in color, spotted with numerous brown dots.

Head broader than long, with frontal margin almost straight, very slightly produced in the middle. On either side, a little anterior to the middle of the lateral margin, is a process terminating in two spines. The eyes are large, composite, and placed near the lateral margin, about halfway between the posterior and anterior margins of the head. The first pair of antennæ extend to the end of the fourth joint of the peduncle of the second pair. The basal joint of the peduncle is large, dilated; the two following joints are slender; the flagellum consists of twenty joints. The second pair of antennæ are longer than the body. The first four joints are short, with an articulated exopod on the third joint; the fifth and sixth joints are very long, the fifth being slightly longer than the sixth; the flagellum consists of numerous joints.

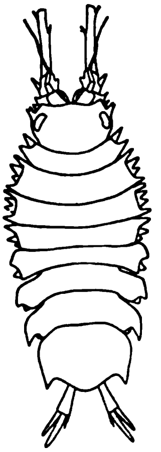

FIG. 521.—IOLELLA HOLMESI. × 7.

The posterior portion of the lateral margin of the first segment of the thorax is produced on either side in a triangular process; the epimeron is situated at the anterior portion of the lateral margin and is produced in a triangular process about as long as the posterior one. The anterior as well as the posterior lateral angles of the second and third segments are each produced in a long process, with the bifurcate epimeron situated between. The anterior portion only of the lateral margin of the fourth segment is produced with the bifurcate epimeron situated at the posterior portion of the segment. The fifth, sixth, and seventh segments have the anterior portion of the lateral margin produced in a process which extends outward and downward and in the last segment is triangularly produced at the posterior extremity, the epimeron in each segment occupying the posterior portion of the segment.

The abdomen is composed of a single segment, the posterior margin of which has a widely rounded median expansion with an acutely pointed lateral expansion on either side. The uropoda are about equal to the abdomen in length; the outer branch is slightly shorter than the inner one; the basal joint is equal in length to the outer branch.

The legs are all furnished with bi-unguiculate dactyli. The first pair are prehensile, the carpus being very large and armed with spines along the inner margin; the propodus is serrulate along the inner margin at the proximal end.

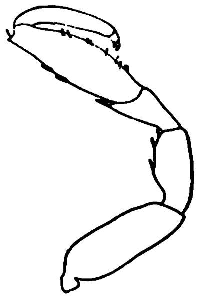

FIG. 522.—IOLELLA HOLMESI. FIRST LEG OF FEMALE. × 20¼.

Two specimens, both females, were taken by the U. S. Bureau of Fisheries steamer *Albatross* at station 4253, Stephens Passage, southeastern Alaska, and station 4228, vicinity of Naha Bay, Behm Canal, southeastern Alaska. Depth, 41 to 188 fathoms. Type in the U. S. National Museum, Cat. No. 29249.

This species is named for Dr. Samuel J. Holmes, who has done much work on the Crustacea of the Pacific coast.

IOLELLA SARSI, new species.

Body twice as wide as long, 5 mm.: 10½ mm.; surface densely covered with short, stiff hairs.

Head wider than long, 2 mm.: 3 mm. Front without rostrum; anterior margin nearly straight, with only a small, median obtuse point. Lateral margins produced in an anterior lobe bearing three feeble spines and a smaller, almost inconspicuous lobe also armed with three feeble spines. Antero-lateral angles rounded. Eyes moderately large, round, composite, situated close to the lateral margins. The first pair of antennæ have the basal article of the peduncle large and dilated; the second article is half as long and about half as wide; the third article is a little longer than the second. The flagellum is composed of numerous short articles. The second pair of antennæ are broken at the fourth article of the peduncle, and the distal parts are lost. There is a distinct scale outside the third article. The articles of the peduncle, as well as the antennal scale, are beset with spines.

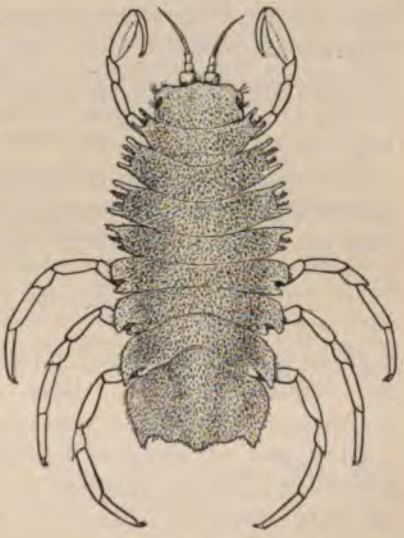

FIG. 523.—IOLELLA SARSI.

The first segment of the thorax has both the anterior and the posterior angles produced in long, narrow processes, with the epimeron, consisting of a single, narrow process, situated between the two. The second and third segments of the thorax have the anterior and the posterior margins produced into long, narrow processes, with the epimeron, consisting of two long processes, situated between the two. The fourth segment has the anterior portion only produced in a long, narrow process, with the epimeron produced in two processes, and situated in the posterior emargination of the segment. The fifth, sixth, and seventh segments have the anterior part produced and gradually increasing in width, with the epimeron situated in the posterior emargination of the segment. The lateral processes of the segments, as well as the epimera, are beset with spines.

The abdomen consists of a large terminal segment, with two short segments anterior to it, evident only in the middle part, being covered at the sides by the seventh thoracic segment.

The terminal segment is broader than long, 3 mm.: 4½ mm. Tl post-lateral angles are acutely produced but short. Between the post-lateral angles the posterior margin is trilobate, the median lobe being the largest, and not longer than the post-lateral angles. The margins of the segment are beset with spines.

The uropoda are lost in the only specimen.

The distal extremity of the peduncle and the branch of the first pleopoda of the male are fused and have the tip dilated and produced as in *Janiropsis* Sars.

The type, a male, and the only specimen, was collected by Dr. W. H. Dall at Constantine Bay, Amchitka Islands, Alaska, in 1873. Depth 8 fathoms.

The type is in the U. S. National Museum, Cat. No. 32076.

This species is very closely related to *Iolella holmesi* (Richardson), but differs in the shape of the terminal abdominal segment, in having the anterior angles of the first thoracic segment produced with the epimeron situated between the antero- and post-lateral processes, and in having the lateral margins of the head but little produced and armed with numerous spines.

This species is named in honor of Prof. G. O. Sars, the distinguished carcinologist, for whose courteous and generous permission to reproduce his plates in this work, I am most grateful.

75. Genus JANIRA Leach.[a]

Body oblong, depressed. Lateral parts of head not produced or but slightly produced. Eyes distinct, sub-dorsal. Front of head obtuse or produced in a comparitively small rostrum.

First pair of antennæ well developed, with the flagellum multi-articulate. Second antennæ very much elongated, with scale outside of third article of peduncle. Maxillipeds with the second and third articles of the palp not expanded.

Segments of thorax with lateral parts not produced into lappets.

The distal extremity of the peduncle and the branch of the first pleopoda of the male not dilated at the tip.

Uropoda largely developed.

First pair of legs prehensile in both sexes; dactylus in all the legs tri-unguiculate.

Terminal segment of the body rounded, not expanded laterally.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS JANIRA.

a. Anterior margin of the head straight.
  b. First pair of legs alike in both sexes, with carpus large, subfusiform, and edged inside with spines. Distal part of lateral margins of terminal segment of body coarsely serrated. Epimera bilobed.................*Janira maculosa* Leach

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 98-99.

b'. First pair of legs unlike in the two sexes, though prehensile. In male the carpus of the first pair of legs is large and produced on the inside at its outer distal end in a long acute process, between which and the articulation of the propodus are two long acute processes about half as long as the outer process. Distal part of lateral margins of terminal segment of body not serrated. Epimera single lobed........................... *Janira minuta* Richardson

a'. Anterior margin of the head not straight.

b. Front of head trilobate, the central lobe subacute, rather longer than others, but not rostrate................................. *Janira occidentalis* Walker

b'. Front of head produced in the middle in a short, sharp rostrum, and the antero-lateral angles of the head also produced.

c. Antero-lateral angles of head sharp. Lateral margins of first four thoracic segments obtusely incised, each showing two broad angulations. Uropoda of female shorter than half the terminal segment; those of male as long as terminal segment of body..................... *Janira tricornis* (Krøyer)

c'. Antero-lateral angles of the head very slightly produced and rounded. Margins of the first thoracic segment rounded, not emarginate. Uropoda alike in the two sexes, and longer than the terminal segment of the body. Abdomen serrate on posterior half of lateral margin..*Janira alta* (Stimpson)

JANIRA MACULOSA Leach.

Janira maculosa Leach, Edinburgh Encyclop., VII, 1813–14, p. 434.

Oniscoda maculosa Latreille, Cuvier's Règne Anim., 2d ed., IV, 1829, p. 141.—Milne Edwards, Hist. Nat. Crust., III, 1840, p. 151.

Henopomus muticus Krøyer, Voy. en Scand., Crust., 1849, pl. xxx, figs. 1a–n; Nat. Tidsskr. (2), II, 1846–49, p. 366.—Bate and Westwood, British Sessile-eyed Crust., II, 1868, pp. 338–340.—Hansen, Vid. Medd. Naturh. Foren. i Kjøbh., 1887–88, p. 190.—Sars, Crust. Norway, II, 1899, pp. 99–100, pl. xl.—Richardson, American Naturalist, XXXIV, 1900, p. 299; Proc. U. S. Nat. Mus., XXIII, 1901, p. 555.

Localities.—Latitude 66° 32′ north, longitude 55° 34′ west; latitude 72° 32′ north, longitude, 58° 51′ west; also, British Isles; Kattegat; Dutch coast; coast of France; coast of Norway.

Depth.—30 to 116 fathoms.

"Body oblong oval in form, about three times as long as it is broad, and slightly narrowed both in front and behind. Cephalon with the lateral expansions evenly rounded, frontal edge straight, without a trace of rostrum. Anterior segments of mesosome with the lateral parts slightly produced at both corners, but not covering the small coxal plates, which are bi-lobate. Caudal segment sub-circular, distal part of lateral edges coarsely serrated. Eyes well developed, rounded oval, with dark pigment. Superior antennæ reaching about to the end of the penultimate peduncular joint of the inferior ones, flagellum more than twice as long as the peduncle, and composed of about thirty articulations. Inferior antennæ considerably exceeding the length of the body, the last two peduncular joints rather elongated, subequal, flagellum about twice the length of the peduncle. Epignath of the maxillipeds with the outer edge angular in the middle. First pair of legs with the carpus about the length of the two preceding joints combined, and armed inside with 18–20 spines; dactylar claws in all pairs nearly equal. Middle piece of male operculum not expanded at the end, which is quadrilobate. Uropoda exceeding in length the caudal segment, basal part rather elongated, though not quite as long as the inner ramus, outer ramus somewhat smaller than the inner, both being linear in form. Color, yellowish, densely mottled with reddish brown specks. Length of adult female, 7 mm., of male, 10 mm."—G. O. SARS.[a]

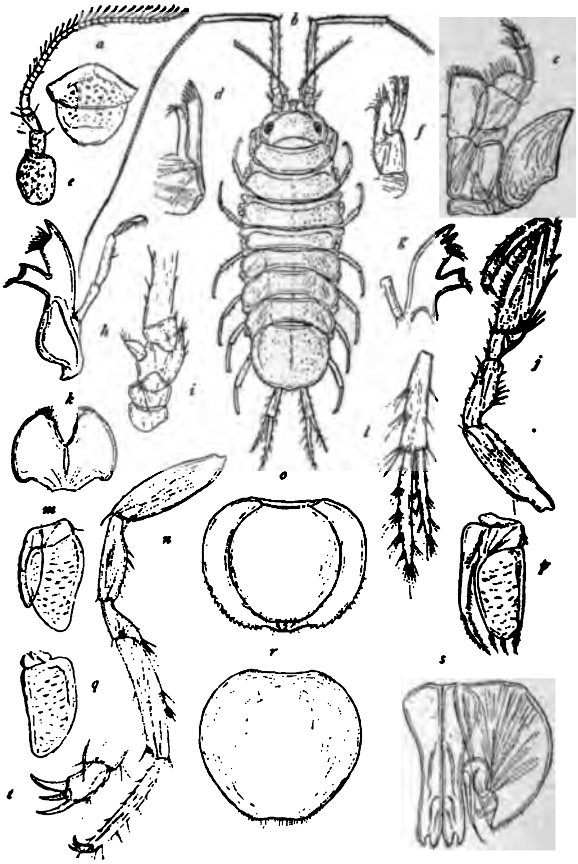

FIG. 524.—JANIRA MACULOSA (AFTER SARS). *a*, ANTERIOR LIP. *b*, DORSAL VIEW OF FEMALE. *c*, MAXILLIPED. *d*, FIRST MAXILLA. *e*, FIRST ANTENNA. *f*, SECOND MAXILLA. *g*, MANDIBLE. *h*, MANDIBLE WITH PALP. *i*, SECOND ANTENNA. *j*, FIRST LEG. *k*, POSTERIOR LIP. *l*, UROPOD. *m*, FOURTH PLEOPOD OF FEMALE. *n*, FIFTH LEG. *o*, ABDOMEN (INNER SIDE). *p*, THIRD PLEOPOD OF FEMALE. *q*, FIFTH PLEOPOD OF FEMALE. *r*, FEMALE OPERCULUM. *s*, FIRST AND SECOND PLEOPODS OF MALE. *t*, TERMINAL JOINT OF FIFTH LEG.

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[a] Crust. of Norway, II, 1899, pp. 99–100.

JANIRA MINUTA Richardson.

Janira minuta Richardson, Trans. Conn. Acad. Sciences, XI, 1902, p. 297, pl. xxxix, figs. 50-52.

Locality.—Castle Harbor, Bermudas, in dead coral.

Surface of body smooth. Color light yellow, almost white, spotted with black.

Head with frontal margin straight; eyes large, conspicuous, oblong, and situated at the lateral margin. First pair of antennæ with the three peduncular articles equal in length, the first one, however, being very much the broadest, the second a little stouter than the third; flagellum multi-articulate, composed of about ten or eleven articles. The second pair of antennæ have a scale outside the third article of the peduncle; flagellum multi-articulate, much longer than the body. Thoracic segments subequal in length. First segment with the lateral margin entire, epimeron not evident from a dorsal view. Second and third segments with margins entire, straight, epimera evident about the middle of the segments. Fourth segment with the posterior half of the lateral margin slightly excavate, the epimeron evident in the excavation. The last three segments with the lateral margins entire, the epimera evident as small lobes at the post-lateral angles.

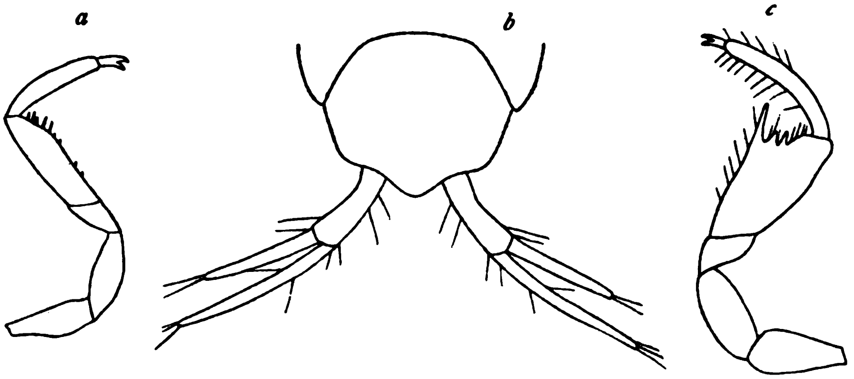

Fig. 525.—Janira minuta. *a*, Leg of first pair of female. × 58. *b*, Terminal segment and uropoda. × 58. *c*, Leg of first pair of male. × 58.

The terminal segment is about as broad as long, rounded posteriorly with a median lobe between the peduncular joints of the uropoda. The uropoda extend much beyond the terminal segment, being longer than that segment. The outer branch is somewhat shorter than the inner branch; both branches are longer than the peduncle, and are fringed with long hairs.

In the female the first pair of legs are prehensile; the others simple walking legs, with bi-unguiculate dactyli. In the male, ho ever, the first pair of legs are modified, though prehensile. Th carpal joint is very much enlarged and is produced on the inside, at the outer distal end, in a long, acute process, between which and the articulation of the propodus are two long acute processes about half as long as the outer process. The propodus is similar to that of the female; the dactylus is biunguiculate.

A number of specimens, both males and females, were collected by Prof. A. E. Verrill and party in 1898, at Castle Harbor, Bermudas.

Type specimens in Peabody Museum, Yale University. Cat. Nos. 3194 and 3261.

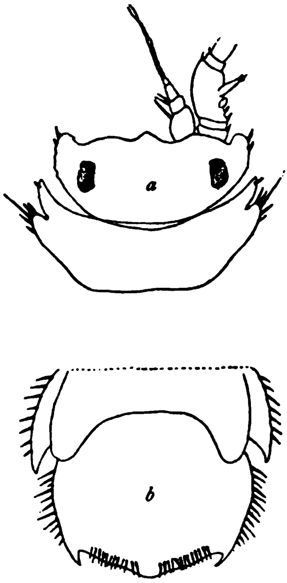

FIG. 526.—JANIRA OCCIDENTALIS (AFTER WALKER). *a*, HEAD AND FIRST THORACIC SEGMENT. *b*, ABDOMEN AND PART OF PREVIOUS SEGMENT OF THORAX.

JANIRA OCCIDENTALIS Walker.

Janira occidentalis WALKER, Trans. Liverpool Biol. Soc., XII, 1898, pp. 280–281, pl. xv, figs. 7-10.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 859; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 326; American Naturalist, XXXIV, 1900, p. 300; Harriman Alaska Exp., Crust., X, 1904, p. 224; Proc. U. S. Nat. Mus., XXVII, 1904, p. 667.

Locality.—Puget Sound, Washington.

Body oblong-ovate, three times longer than wide, 2 mm. : 6 mm.

Head, about twice as wide as long, with the anterior margin sinuate, but not produced in a frontal median process. The lateral margins are straight, with the antero-lateral angles a little produced and rounded and the post-lateral angles rounded. The eyes are large, round, composite, and dorsally placed. The first pair of antennæ have the first and third articles about equal in length; the second is

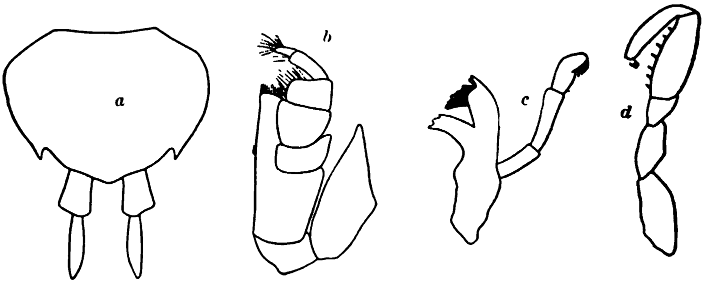

FIG. 527.—JANIRA OCCIDENTALIS. *a*, ABDOMEN WITH UROPODA.[a] *b*, MAXILLIPED. × 51⅓ *c*, MANDIBLE. × 51⅓. *d*, FIRST LEG. × 27½.

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[a] The outer branch of both uropoda is broken off and lost in the only specimen of the U. S. National Museum collection.

about one and a half times longer than the third. The flagellum is composed of eleven articles. The second pair of antennæ have the first four articles short and nearly subequal, the first two being somewhat shorter than the last two. An antennal scale is articulated to the third article. The fifth and sixth articles are long, the sixth being a little longer than the fifth. The fifth article is 1 mm. in length; the sixth is a little more than 1 mm. long. The flagellum is multiarticulate, and 2 mm. long. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

The first segment of the thorax has the post-lateral lobe large and produced, the antero-lateral lobe obsolete, with the epimeral lobe at the antero-lateral angles. The second and third segments have the antero- and post-lateral lobes small, but produced and conspicuous, the lateral margin between them being straight; the epimeron is in two lobes, and occupies a position between the antero- and post-lateral lobes in both segments. The fourth segment has the antero- and post-lateral lobes small, but produced and conspicuous; the post-lateral lobe is smaller than the antero-lateral lobe, while in the two preceding segments the antero-lateral lobe is the smaller one; the epimeron of the fourth segment is a single lobe between the antero- and post-lateral lobes. In the fifth segment the antero-lateral lobe is large and produced, the post-lateral lobe minute, and almost inconspicuous; the epimeron is a single lobe between the two. The sixth and seventh segments have the antero-lateral lobes large and prominent, the post-lateral lobes obsolete, and the epimeron situated at the post-lateral angles.

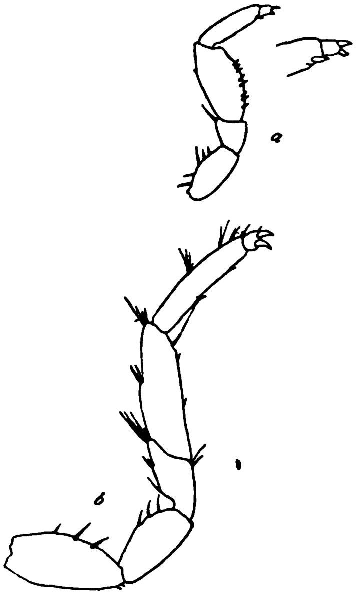

FIG. 528.—JANIRA OCCIDENTALIS (AFTER WALKER). *a*, FIRST LEG. *b*, THIRD LEG.

The abdomen is composed of a single large segment, the post-lateral angles of which are small but very acutely produced. The posterior margin has a large median rounded lobe. The uropoda are not quite as long as the abdomen. The peduncle is about one-third the length of the terminal segment. The inner branch is one and a half times longer than the peduncle. The outer branch is lost in both uropoda the specimen examined.

The first pair of legs are prehensile, but not longer than the oth The six following pairs are ambulatory, with bi-unguiculate dactyl

JANIRA TRICORNIS (Krøyer).

Henopomus tricornis KRØYER, Voy. en Scand., Crust., 1849, pl. xxx, figs. 2 a–q; Nat. Tidsskr. (2), II, 1846–49, p. 372–379, 380.

Janira tricornis HANSEN, Vid. Medd. naturh. Foren. i Kjøbh., 1887–88, pp. 190–191.—RICHARDSON, Amer. naturalist, XXXIV, 1900, p. 300; Proc. U. S. Nat. Mus., XXIII, 1901, p. 555.—STEBBING, Ann. Mag. Nat. Hist. (7), V, 1900, p. 14.—OHLIN, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 30–31.

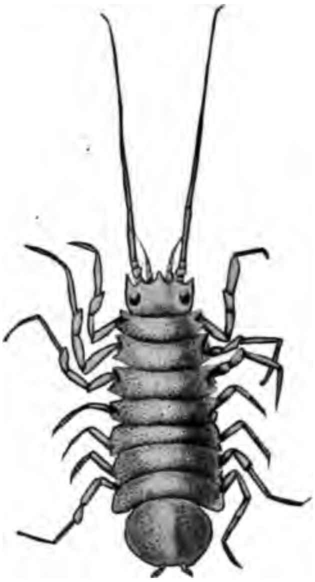

FIG. 529.—JANIRA TRICORNIS (AFTER KRØYER).

Localities.—Kangerdluarsuk; Sukkertoppen; Egedesminde; latitude 65° 11′ north, longitude 53° 33′ west.

Depth.—5 to 50 fathoms; 20 to 80 meters (Ohlin).

Body wide, the width equaling almost half the length.

Head armed anteriorly with three horns or spines, placed in a transverse series.

The second pair of antennæ are equal to the length of the body; the second article of the peduncle is very stout and armed on the exterior margin with a large spine (scale).

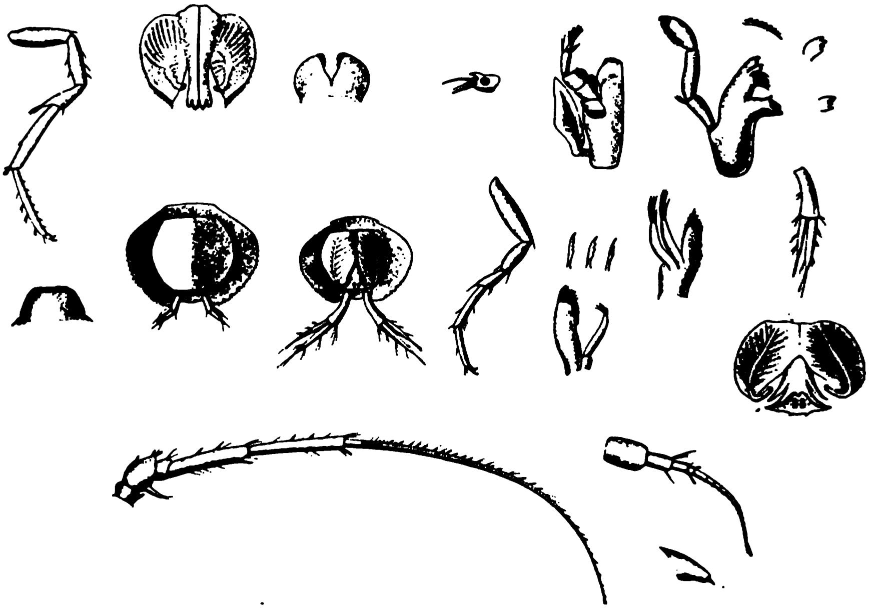

FIG. 530.—JANIRA TRICO KRØYER). SHOWING DETAILED PARTS.

The abdomen is subelliptical in shape or obsoletely six angulate, much wider than long.

The median lobe of the covering lamella of the pleopods (the peduncle of the first pleopoda) in the males is posteriorly entire.[a]

A fuller description of this species is given in the preceding pages (372–379) of the work from which the above is quoted.

JANIRA ALTA (Stimpson.)

Asellodes alta STIMPSON, Smithsonian Contributions to Knowledge, VI, 1853, p. 41, pl. III, fig. 30.—VERRILL, Am. Jour. Sci., VI, 1873, p. 439; VII, 1874, pp. 411–502; Proc. Amer. Assoc., 1874, p. 350.

Janira alta HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 158; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 321–322, pls. II–III, figs. 9, 12, 13.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 300; Proc. U. S. Nat. Mus., XXIII, 1901, p. 556.

Localities.—Long Island; Massachusetts Bay; near Eastport, Maine; Gulf of Maine; Grand Menan; Bay of Fundy; 120 miles south of Halifax; Grand Banks; Clarkes Ledge; 30 miles east of Sable Island; off Chesapeake Bay.

Depth.—35 to 487 fathoms.

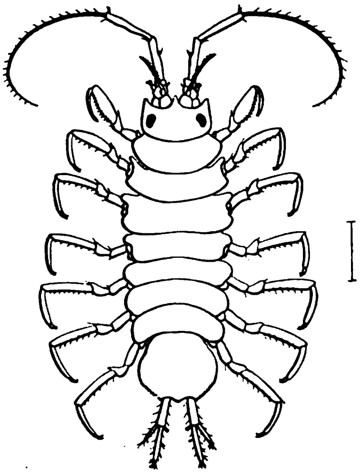

FIG. 531.—JANIRA ALTA (AFTER HARGER). × 5.

Body oblong-ovate, nearly three times longer than wide, 2½ mm.: 7 mm., not including the uropoda.

Head nearly three times as broad as long, with the lateral portions expanded and the lateral margins straight. The front is produced in the middle in a long narrow process with apex rounded. The eyes are small, round, composite, and dorsally placed. The antero-lateral angles of the head are very slightly produced and are rounded. The first pair of antennæ have the three articles, forming the peduncle, about equal in length. The flagellum is composed of fourteen articles. The second pair of antennæ have the first four articles short and subequal; the two following ones are very long, the sixth being longer than the fifth. The sixth article is 2 mm. in length; the fifth is 1½ mm. long. The flagellum is multiarticulate and is 5 mm. long. The second antennæ are as long as the body. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

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[a] The above description is adapted from the following one of Krøyer's:

Latior (latitudo dimidiam fere æquans longitudinem). Caput antice tribus a tum cornibus vel aculeis, serie positis transversali. Antennæ inferiores longitudi animalis æquantes, articulo pedunculi secundo crassissimo, aculeo marginis exter maximo. Abdomen subellipticum vel obsolete sexangulatum, multo latius q longum. Lobus laminæ branchiarum tectoriæ intermedius apud mares pos integer.—KRØYER, Nat. Tidsskr. (2), II, 1846–49, pp. 372–379, 380.

The first segment of the thorax has the post-lateral lobes large and prominent; the antero-lateral lobes are obsolete, but small epimeral lobes, one on either side, are conspicuous at the antero-lateral angles of the segment. The second, third, and fourth segments have each a conspicuous but small antero-lateral lobe on either side, produced beyond the large post-lateral portion of the segment, and between the anterior and posterior lobes is the small but conspicuous epimeral lobe. The last three segments have a large antero-lateral lobe, with the post-lateral lobe obsolete, and the small epimeral lobe situated at the post-lateral angles.

The abdomen is composed of a single large segment, the post-lateral angles of which are widely rounded, and the posterior margin has a prominent rounded median lobe. The posterior half of the lateral margins and the margins of the post-lateral angles are strongly serrate. The uropoda are about one and a fourth times longer than the abdomen. The peduncle is as long as two-thirds the length of the abdomen. The outer branch is as long as the peduncle. The inner branch is one and a half times the length of the outer branch.

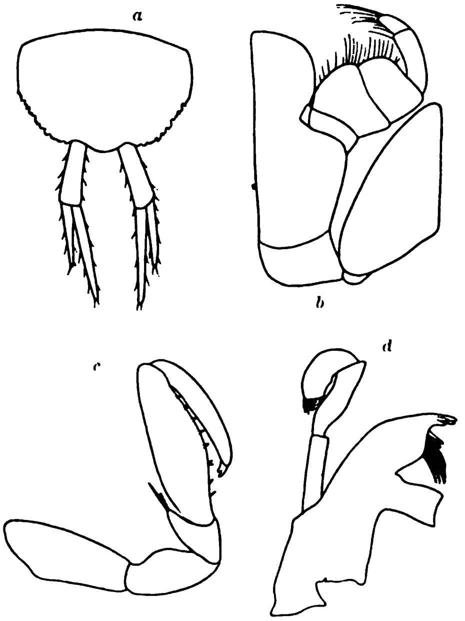

FIG. 532.—JANIRA ALTA. *a*, ABDOMEN WITH UROPODA. × 15¾. *b*, MAXILLIPED. × 51¾. *c*, FIRST LEG. × 27½. *d*, MANDIBLE. × 51¾.

The first pair of legs are prehensile, but are not longer than the others. The six following pairs are ambulatory with bi-unguiculate dactyli.

76. Genus JÆROPSIS Kœhler.

Eyes present. Both pairs of antennæ extremely small; flagellum of first pair obsolete; flagellum of second pair rudimentary. Articles of peduncle of second antennæ dilated. Epignath of maxillipeds narrow, produced to a tapering extremity. Apex of mandibles produced in five teeth.

Segments of thorax separated at the sides, not forming an unbroken continuous lateral line.

Legs simple, similar in structure; dactylus bi-unguiculate.

Uropoda short, extremely small.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS JÆROPSIS.

a. Head, second, third, fourth, and seventh thoracic segments and abdomen brown. First, fifth, and sixth thoracic segments perfectly white and colorless. Median lobe of terminal segment of body rounded. Frontal process of head as long as side of head. Eyes moderately large.............. *Jæropsis lobata* Richardson

a′. Color uniformly white. Median lobe of terminal segment of body acute. Frontal process of head about half as long as lateral margin of head. Eyes small. *Jæropsis rathbunæ* Richardson

JÆROPSIS LOBATA Richardson.

Jæropsis lobata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 859-860; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 326-327; American Naturalist XXXIV, 1900, p. 300.

Locality.—Monterey Bay, California.

Surface of body smooth.

Color very peculiar and striking. The head is brown. The first thoracic segment is perfectly white, without any markings. The second, third, and fourth segments are brown. The fifth and sixth are white. The seventh thoracic segment and the caudal segment are brown. This peculiar marking gives the body a striped appearance.

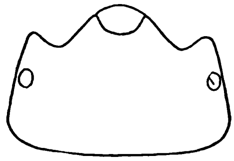

FIG. 533.—JÆROPSIS LOBATA. HEAD. × 27½.

Head large; front produced into two prominent triangular processes, on either side of a deep median excavation in which is placed a small lobe; this gives the head the appearance of being produced in a large rounded median lobe. The antero-lateral angles of the head are acutely produced on either side to a distance equal to one-third the length of the frontal process. The eyes, which are small, are situated on the extreme lateral margins of the head. The first pair of antennæ are extremely small, equal in length to less than half the width of the head; flagellum obsolete. The second pair of antennæ are also extremely short, equal in length to the width of the head, with rudimentary flagellum, composed of about five joints, and with peduncular joints dilated. Mandibles have the cutting part composed of five teeth; palp, three-jointed.

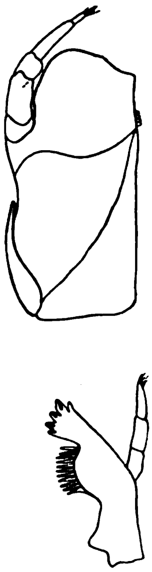

FIG. 534.—JÆROPSIS LOBATA. MAXILLIPED AND MANDIBLE.

The thoracic segments are subequal in length, with lateral ed produced, but not laciniate, and separated from each other by late incisions.

Caudal segment regularly rounded, with two small incisions at the place where the uropoda are attached, between which is a rounded lobe. Uropoda are extremely small, short, nodiform.

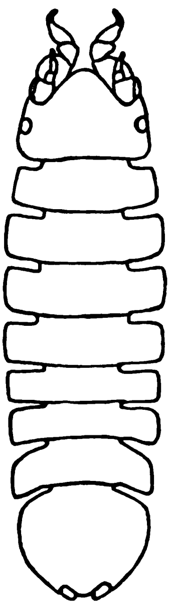

FIG. 535.—JÆROPSIS LOBATA. ×20.

Legs simple, similar in structure, with bi-unguiculate dactyli.

Two specimens from Monterey Bay, California, were sent by Mr. Heath.

Type.—Cat. No. 22583, U.S.N.M.

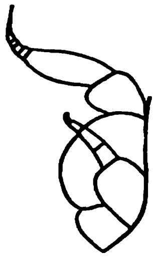

FIG. 536.—JÆROPSIS LOBATA. ANTENNÆ.

This species is very close to *Jæropsis brevicornis*, but differs in the following points: The coloring of the body, which in *J. brevicornis* is perfectly transparent and colorless, with the exception of the head, which is marked with a large brown spot, while in our species the head is dark, as are also the entire second, third, fourth, and seventh thoracic segments and the terminal abdominal segment, the other segments being colorless; in the shape of the terminal segment, which is perfectly rounded in *J. brevicornis* and fringed with hairs, while in our species there are two posterior incisions for the reception of the uropoda, and an absence of hairs; in the larger median lobe on the anterior margin of the head; in the acuteness of the antero-lateral angles of the head, which are rounded in *J. brevicornis;* in the more angular post-lateral angles of the head, and in the more angular antero- and post-lateral angles of the thoracic segments. Other differences are noticed from a comparison of both pairs of antennæ.

JÆROPSIS RATHBUNÆ Richardson.

Jæropsis rathbunæ RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, p. 298, pl. XL, figs. 53–55.

Locality.—Bermudas.

Body elongate, depressed; segments loosely articulated; surface smooth; color uniformly light, almost white.

Head with a median excavation, on either side of which the frontal margin is produced into angulations. On either side of these angulations is another excavation, on the outside of which are lateral angulations. A rounded lobe is placed in the median excavation. The eyes are small and are situated near the lateral margins about halfway between the anterior and posterior margins. The first pair of antennæ consist of five joints, the two first joints being large, the three following ones small, the last fringed with hairs. The second pair of antennæ have a rudimentary flagellum, consisting of five or six joints; the peduncle has the third and fifth joints long and oval in shape, the fourth joint somewhat triangular.

The thoracic segments are loosely articulated. The lateral margins are straight, with no indication of epimera.

The terminal segment of the body is rounded in outline, the posterior margin excavated at the insertion of the uropoda, which do not extend beyond the edge of the segment, thus preserving the oval outline. Between the uropoda there is an acute median projection.

The legs are all simple, with bi-unguiculate dactyli.

One specimen was collected by Prof. A. E. Verrill and party at the Bermudas, and another by Dr. G. B. Goode, from the same locality.

Type specimens in Peabody Museum, Yale University. Cat. No. 3251.

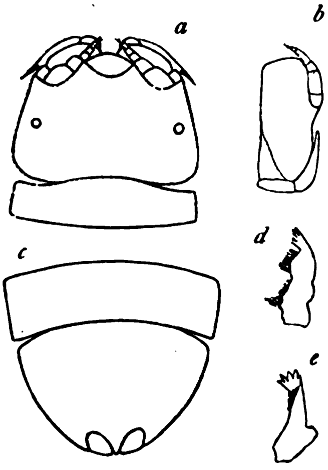

FIG. 537.—JÆROPSIS RATHBUNÆ. *a*, HEAD AND FIRST THORACIC SEGMENT. *b*, MAXILLIPED. *c*, TERMINAL SEGMENT AND UROPODA. *d*, MANDIBLE. *e*, MANDIBLE (ANOTHER VIEW).

Six species of this genus have been heretofore described: *Jæropsis lobata* Kœhler, *Jæropsis marionis* Beddard, *Jæropsis neo-zealandica* Chilton, *Jæropsis lobata* Richardson, *Jæropsis dollfusi* Norman, and *Jæropsis curvicornis* (Nicolet).[a] The present species adds another to the above list.

It is named in honor of Miss Mary J. Rathbun.

Family XVIII. MUNNIDÆ.[b]

Body ovate, short and stout, with the three posterior segments of the thorax sharply marked off from the four anterior ones and much smaller, and gradually becoming narrower. Terminal segment of body vaulted above, subpyriform.

Eyes, when present, placed on the tips of lateral peduncle-like projections of the head. First pair of antennæ placed widely apart, with the flagellum multi-articulate. Second pair of antennæ without scale.

First pair of legs much shorter than the following pairs and prehensile. Succeeding pairs more or less rapidly increasing in length, simple, ambulatory. Uropoda small, somewhat separated.

Pleopoda as in the *Janiridæ*.

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[a] *Jæra curvicornis* Nicolet, in Gay's Hist. de Chile, III, 1849, p. 263, Zoöl. Atla Crust., No. 3, fig. 10. This species should be referred to the genus *Jæropsis*.

[b] See Sars for characters of family, Crust. of Norway, II, 1899, p. 105.

77. Genus MUNNA Krøyer.[a]

Body sub-pyriform, vaulted, with the last three segments of the thorax very small. Terminal segment of body narrow, sub-pyriform.

First pair of antennæ short. Second antennæ very much elongated, with the last two articles of the peduncle long and slender.

First pair of legs subcheliform, comparatively small in female, but well developed in male. Last six pairs of legs ambulatory and rapidly increasing in length. Dactylus bi-unguiculate.

Uropoda small, simple.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS MUNNA.

a. Surface of body smooth. Eyes present.

b. Caudal segment with lateral edges evenly convex, and each armed with a single slender denticle; apical lamellæ distinctly serrated. Eyes large. First pair of antennæ with flagellum composed of four joints, including very small apical joint. Flagellum of second antennæ longer than peduncle. Last pair of legs scarcely longer than body. Legs slender. Uropoda obliquely truncate at tip..*Munna fabricii* Krøyer

b′. Caudal segment with lateral edges rather bulging in front, and each armed with four strong denticles; without any serrulated lamellæ. Eyes small. First pair of antennæ with flagellum composed of three joints, including very small apical joint. Flagellum of second antennæ not attaining length of peduncle. Last pair of legs scarcely longer than anterior division of body. Legs shorter and stouter than usual. Uropoda produced at tip into several dentiform projections, one of which is hook-like......................*Munna krøyeri* Goodsir

a′. Surface of body covered with numerous spines. Eyes absent.
Munna cæca, new species

MUNNA FABRICII Krøyer.

Munna fabricii KRØYER, Naturh. Tidsskr. (2), II, 1846–1849, p. 380; Voy. en Scand., Crust., 1849, pl. XXXI, figs. 1a–q.—REINHARDT, Naturhistorisk Bidrag til en Beskrivelse af Grönland, 1857, p. 35.—M. SARS, Chr. Vid. Selsk. Forh., 1858, p. 154, 1859.—LÜTKEN, Crust. Greenland, 1875, p. 150.—HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 325–328, pl. III, fig. 14.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 193–194.—G. O. SARS, Crust. Norway, II, 1899, pp. 108–109, pl. XLV, fig. 2.—STEBBING, Ann. Mag. Nat. Hist. (7), V, 1900, p. 14.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 300; Proc. U. S. Nat. Mus., XXIII, 1901, p. 556.

Localities.—South Bay, Eastport; Casco Bay; Western Bank; Browns Bank; southern Greenland; Godhaven, Egedesminde, Upernivik, latitude 66° 30′ north, longitude, 54° 50′ west; also coast of Finmark; coast of Norway.

Depth. 4 to 200 fathoms. Sars says it occurs, in moderate depths, among Hydroida.

"Body rather short and compact, with the anterior division rounded

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 106.

oval in outline. Ocular processes rather thick and less prominent than in *Munna limicola*. Caudal segment oblong oval, but slightly narrowed behind, lateral edges evenly convex, and each armed in front with a single slender denticle; apical lamellæ distinctly serrated. Eyes rather large, semi-globose. Superior antennæ scarcely reaching to the middle of penultimate peduncular joint of the inferior ones; flagellum composed of only four joints, including the very small apical one. Inferior antennæ rather slender, with the flagellum longer than the peduncle. Legs comparatively slender, though less rapidly increasing in length posteriorly than in the two preceding species (*M. boecki* Krøyer and *M. limicola* Sars); first pair, as usual, much the shortest,

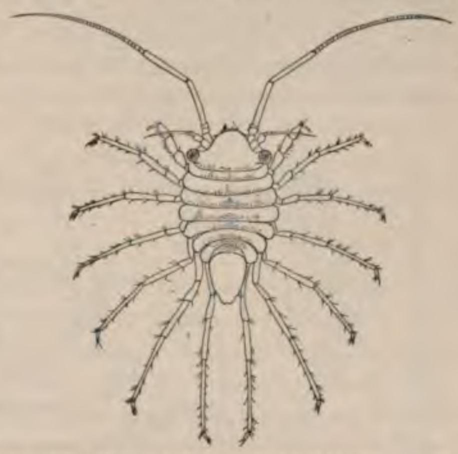

FIG. 538.—MUNNA FABRICII (AFTER HARGER). × 20.

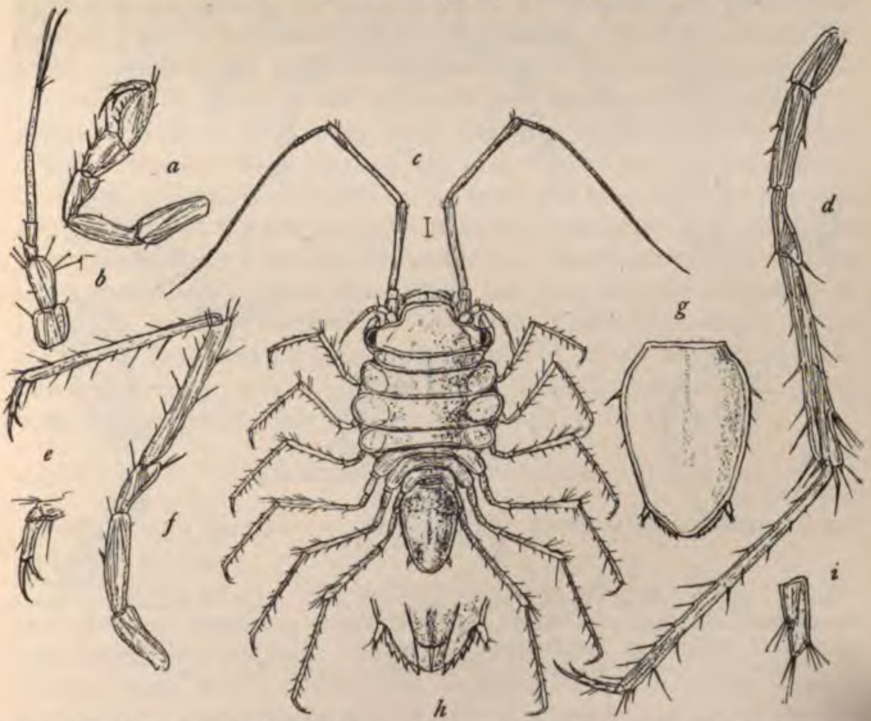

FIG. 539.—MUNNA FABRICII (AFTER SARS). *a*, FIRST LEG. *b*, FIRST ANTENNA. *c*, DORSAL VIEW OF FEMALE. *d*, SEVENTH LEG. *e*, EXTREMITY OF SECOND LEG. *f*, SECOND LEG. *g*, ABDOMEN AND UROPODA. *h*, EXTREMITY OF ABDOMEN WITH UROPODA. *i*, UROPOD.

with the carpus somewhat shorter than the propodus, and armed inside with three spines; last pair scarcely longer than the body, carpal joint somewhat dilated distally. Uropoda obliquely truncated at the tip, and setose at each corner. Color dark brown, from numerous pigmentary spots forming irregular shadows. Length of adult female scarcely reaching to 3 mm."—G. O. SARS.[a]

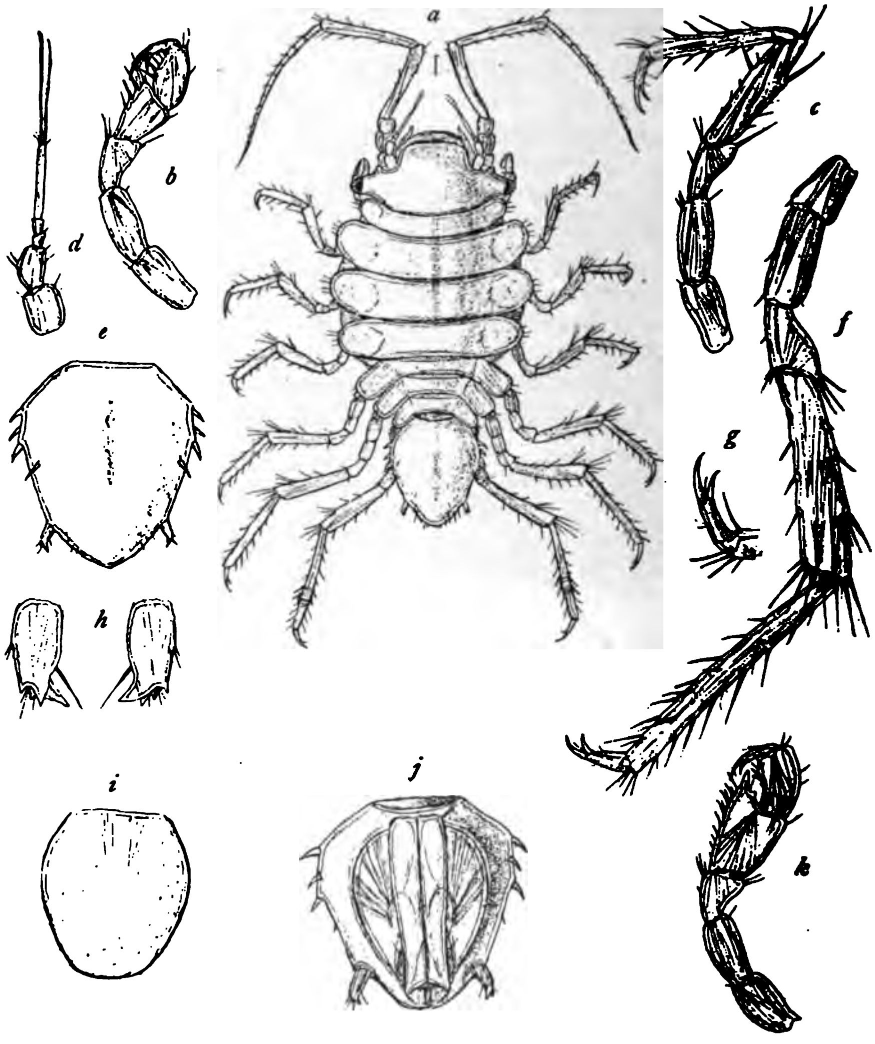

FIG. 540.—MUNNA KRØYERI (AFTER SARS). *a*, DORSAL VIEW OF FEMALE. *b*, FIRST LEG OF FEMALE. *c*, SECOND LEG OF FEMALE. *d*, FIRST ANTENNA. *e*, ABDOMEN OF FEMALE WITH UROPODA (DORSAL VIEW). *f*, SEVENTH LEG. *g*, EXTREMITY OF SEVENTH LEG. *h*, UROPODA. *i*, OPERCULUM OF FEMALE. *j*, ABDOMEN OF MALE WITH UROPODA (VENTRAL VIEW). *k*, FIRST LEG OF MALE.

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[a] Crust. of Norway, II, 1899, pp. 108–109.

MUNNA KRØYERI Goodsir.

Munna krøyeri GOODSIR, Edinburgh New Phil. Jour., XXXIII, 1842, p. 365, pl. VI, fig. 2.—BATE and WESTWOOD, Brit. sessile-eyed Crust., II, 1868, p. 326.

Munna whiteana BATE and WESTWOOD, Brit. sessile-eyed Crust., II, 1868, p. 329.

Munna krøyeri HANSEN, Vid. Medd. naturh. Foren. i Kjøbh., 1888, pp. 194–195.—SARS, Crust. Norway, II, 1899, pp. 109–110, pl. XLVI, fig. 1.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 300; Proc. U. S. Nat. Mus., XXIII, 1901, p. 556.

Localities.—Godhavn and Upernivik, Greenland; also, coast of Norway.

Depth.—10 to 60 fathoms.

"Body of female somewhat robust, with the anterior division oval in form and the segments very sharply marked off from each other and clothed laterally with scattered hairs. Body in male, as usual, much narrower. Ocular processes conically tapered. Caudal segment comparatively short, scarcely more than half as long as the mesosome, and rounded oval in form, lateral edges rather bulging in front, and each armed with four strong denticles, the posterior pair subdorsal, tip bluntly produced, and without any serrated lamellæ. Eyes comparatively small, at least in female. Superior antennæ very short, extending not nearly to the middle of the penultimate peduncular joint of the inferior ones; flagellum composed of only three articulations, including the very small apical joint. Inferior antennæ, as compared with those in the other known species, of inconsiderable length, scarcely as long as the body, flagellum not attaining the length of the peduncle. First pairs of legs in female of the usual structure, in male considerably stronger, with the carpus considerably expanded and produced at the end inside to an acute thumb-like projection, the inner edge of the joint densely setiferous. Ambulatory legs in both sexes shorter and stouter than usual, last pair scarcely exceeding in length the anterior division of the body. Uropoda produced at the tip into several dentiform projections, one of which assumes a hook-like appearance. Color pale yellowish, slightly mottled with light brown. Length of adult female about 3 mm."—G. O. SARS.[a]

MUNNA CÆCA, new species.

Body ovate; surface rough and spiny, beset with numerous long and small spines.

Head produced in front between the basal articles of the antennæ in a rounded process. Eyes absent. Dorsal surface of head beset with long, narrow spines. About the middle of the head is a long median spine, with a shorter one on either side. On either side of the shorter spines is another long spine. Close to the lateral margin is a long spine. The antero-lateral lobes are produced in bifid spines.

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[a] Crust. of Norway, II, 1899, pp. 109–110.

On either side of the head the lateral margin is produced in a large spine. Numerous small spines also beset the dorsal surface of the head. The first pair of antennæ have the first two articles about equal in length, the second a little more slender than the first; the third article is twice as long as the second. The flagellum is composed of twenty-three articles and extends about two-thirds the length of the fourth article of the peduncle of the second pair of antennæ. The first three articles of the peduncle of the second pair of antennæ are short and beset with numerous spines; the fourth article is very long; the fifth is equal in length to the fourth. The flagellum is composed of about twenty-seven articles.

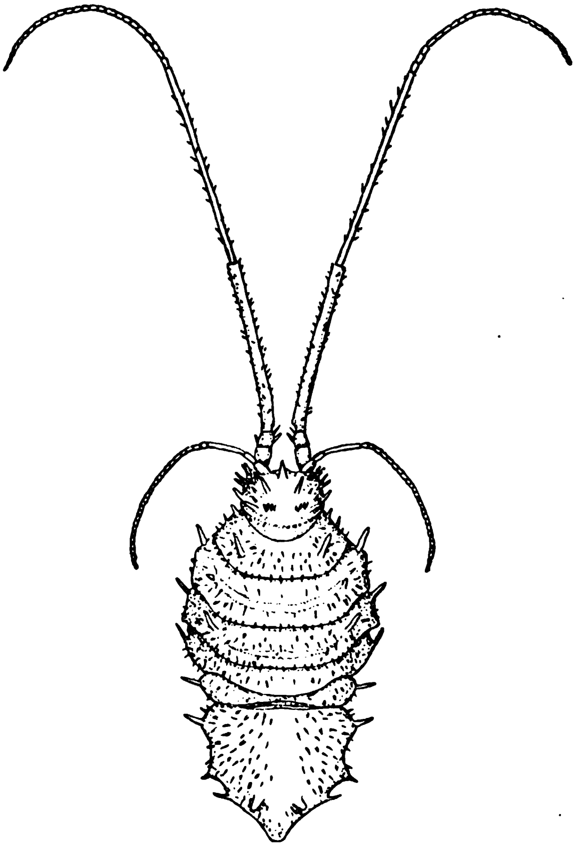

Fig. 541.—Munna cæca. × 6.

The first four segments of the thorax are the largest. The thorax is broadest about the third and fourth segments. The following three segments become gradually much narrower and shorter. The first segment is beset with numerous long, slender spines. There is a long, conspicuous spine on either side of the lateral margin of each segment, and numerous spines, both [illegible] hort, with stiff hairs on the dorsal surface. A long, conspicuous spine projects forward on either side of the first thoracic segment at the place of union of the lateral part of the segment with the dorsal portion. The same occurs on the third segment.

The abdomen tapers to a bluntly pointed extremity. About two-thirds the distance between the base and the extremity are two strong tubercles, one on either side of the median line. On either side of the median line, where there is a comparatively smooth area, the surface of the abdomen is covered with long and short spines. There are also two long spines on either side of the lateral margin near the middle of the segment, and numerous ones near the base.

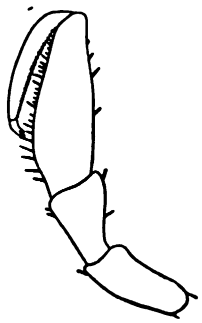

FIG. 542.—MUNNA CÆCA. FIRST LEG. × 15½.

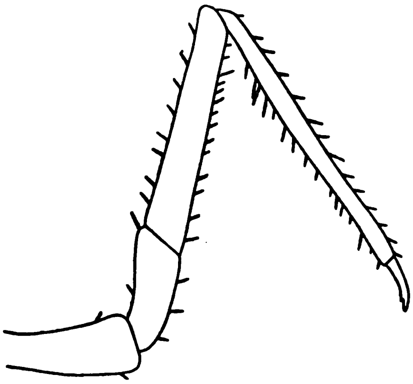

FIG. 543.—MUNNA CÆCA. SECOND LEG. × 15½.

The first pair of legs are prehensile. All the others are ambulatory, and very much elongated.

The uropoda are small, almost inconspicuous, single-branched, and composed of only one tiny article.

A single specimen of this species was collected by the U. S. Bureau of Fisheries steamer *Albatross* at Station 4390, off Santa Catalina Islands, coast of southern California, latitude 33° 2′ 15″ north, longitude 120° 42′ west. Depth, 2,182 fathoms. The type is in the U. S. National Museum, Cat. No. 32072.

Family XIX. MUNNOPSIDÆ.[a]

Eyes wanting. Two divisions of thorax sharply defined.

First pair of antennæ with flagellum well developed. Second pair of antennæ very much elongated.

First pair of legs generally smaller than the others, never subcheliform; three following pairs very much elongated and ambulatory in character; last three pairs of legs natatory in character, with some of the joints flattened and expanded, and fringed with plumose hairs.

Uropoda small.

Pleopoda as in the *Janiridæ*.

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[a] See Sars for characters of family, Crust. of Norway, II, 1899, p. 131.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY MUNNOPSIDÆ.

a. Head of moderate size, deeply emarginate on each side for the insertion of the antennæ, frontal part produced. First four thoracic segments transversely excavated dorsally. First pair of antennæ with flagellum multiarticulate. Natatory legs of the same structure, carpal joint foliaceous.

b. Body with anterior division much broader than posterior; three posterior segments densely crowded together. Mandibles without any molar expansion; cutting edge but slightly dentated. First two pairs of legs of same structure, though somewhat different in size; two succeeding pairs elongated. Dactylus wanting on natatory legs. Uropoda simple, biarticulate.
Genus *Munnopsis* M. Sars

b'. Body with anterior division less sharply marked off from posterior; three posterior segments very large and broad. Mandibles with molar expansion; cutting edge divided into strong teeth. First pairs of legs shorter than three succeeding pairs, which are subequal and very much elongated. Dactylus distinct on natatory legs. Uropoda biramous, branches single jointed.
Genus *Eurycope* G. O. Sars

a'. Head very large and broad, transversely truncated in front, lateral parts greatly expanded. First four thoracic segments slightly excavated transversely. First pair of antennæ with flagellum not much elongated. First two pairs of natatory legs of similar structure, carpal joint large and expanded, cordiform; last pair much narrower than two preceding pairs, carpal joint but slightly expanded. Caudal segment triangular in form...Genus *Ilyarachna* G. O. Sars

78. Genus MUNNOPSIS M. Sars.[a]

Anterior division of body broader than posterior division. Head moderately large, deeply emarginate on either side of a narrow frontal process. First pair of antennæ with a multiarticulate flagellum, longer in male than in female. Second pair of antennæ with the last two articles of the peduncle greatly elongated. Mandibles without molar expansion; cutting edge but slightly dentated.

First four segments of thorax transversely excavated dorsally; the three last segments crowded together and very convex.

Terminal segment of body large, oblong-ovate.

First two pairs of legs of similar structure, but differing in size; two following pairs exceedingly long and slender; natatory legs of similar structure, carpus and propodus expanded, dactylus wanting. Uropoda simple, biarticulate.

MUNNOPSIS TYPICA M. Sars.

Munnopsis typica M. SARS, Chr. Vid. Selsk. Forh., 1860, p. 84, 1861.—G. O. SARS, Chr. Vid. Selsk. Forh., 1863, p. 206, 1864; Nyt. Magazin for Naturvidenskaberne, 1866, p. 5.--M. SARS, Christ. Fjord Fauna, 1868, p. 70, pls. VI, VII, figs. 101-138; Chr. Vid. Selsk. Forh., 1868, p. 261, 1869.—G. O. SARS, Nyt. Magazin for Naturvidenskaberne, 1869, p. 44; Chr. Vid. Selsk. Forh., 1872, p. 79, 1873.—BUCHHOLZ, Zweite Deutsche Nordpolfahrt, Crust., 1874, p. 285.—HELLER, Denksch. Acad. Wiss. Wien, XXXV, 1878, p. (14) 38.—NORMAN, Proc. Royal Soc., XXV, 1876, p. 208.—G. O. SARS, Arch. Math. Nat., II,

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 132.

1877, p. 353 (253).—MIERS, Ann. Mag. Nat. Hist. (4), XIX, 1877, p. 65.—HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Comm. of Fish and Fisheries, 1880, Pt. 6, pp. 330–332, pl. II, fig. 11. (See Harger for synonymy.)—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 195.—AXEL OHLIN, Akademisk Afhandling, XXII, 1895, p. 18.—SARS, Crust. of Norway, II, 1899, pp. 133–134, pls. LVII–LVIII.—STEBBING, Ann. Mag. Nat. Hist. (7), V, 1900, p. 14.—OHLIN, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 31–33.—ORTMANN, Proc. Phil. Acad. Nat. Sci., 1901, p. 159.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 557.

Localities.—Bay of Fundy; Gulf of St. Lawrence; Baffin Bay; Davis Straits; Murchison Sound; latitude 72° 8′ north, longitude 74° 20′ west; latitude 71° 57′ north, longitude 73° 56′ west; latitude 69° 31′ north, longitude 56° 1′ west; Umanakfjord; latitude 71° 10′ north, longitude 58° 56′ west; Cape Napoleon, Grinnell Land, or latitude 79° 38′ north; Cape Frazer, or latitude 79° 44′ north; between Norway and Iceland; Christiania fjord; off Storeggen; Loffoden Islan coast of Finmark; Spitzbergen; Arctic Ocean; Kara Sea; Fou Fjord; Granville Bay; Olriks Bay.

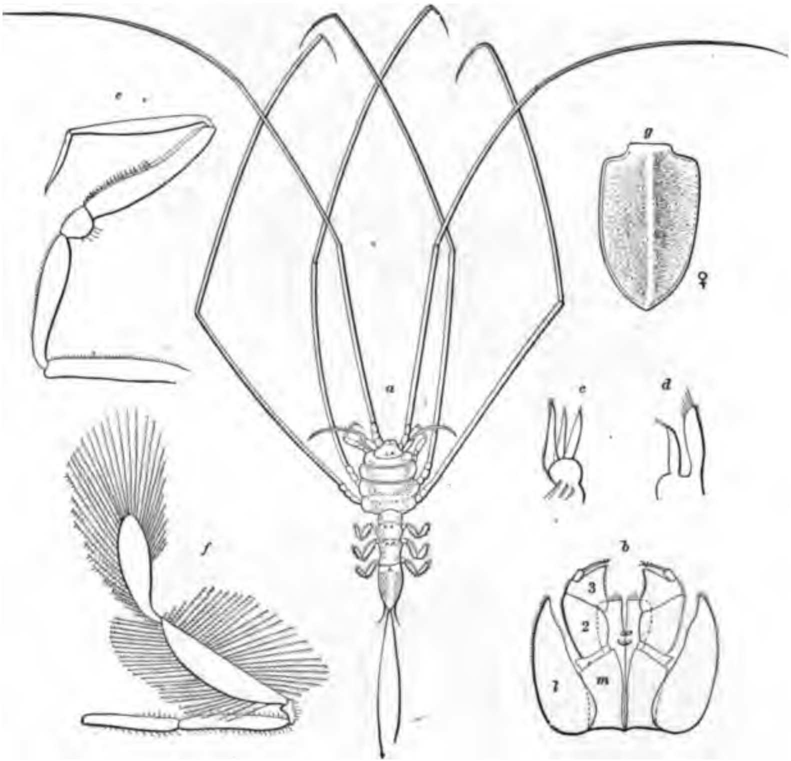

FIG. 544.—MUNNOPSIS TYPICA (AFTER HARGER). *a*, DORSAL VIEW OF MALE. × 2. *b*, MAXILLIPEDS (*m*, BASAL SEGMENT; *l*, EXTERNAL LAMELLA; 2 AND 3, SECOND AND THIRD SEGMENTS OF PALP). *c*, SECOND MAXILLA. *d*, FIRST MAXILLA. *e*, SECOND LEG OF MALE. *f*, ONE OF NATATORY LEGS. *g*, OPERCULUM.

Depth.—5 to 400 fathoms.

Ohlin says of the color: It is "somewhat light chestnut-brown, the second pair of antennæ and the third and fourth pair of pereiopoda of the same color, only darker, except a ring on the distal ends of the fourth and fifth joints of the antennæ and of the fourth joint of the pereiopoda, together with the whole fifth joint and the claw, which parts are white."[a]

Body narrow, elongate, the anterior portion, consisting of the head and the first four thoracic segments considerably wider than the posterior portion, consisting of the last three thoracic segments and the abdomen. Width of anterior portion, 5 mm. Width of posterior portion, 3 mm. Length of body, 13 mm.

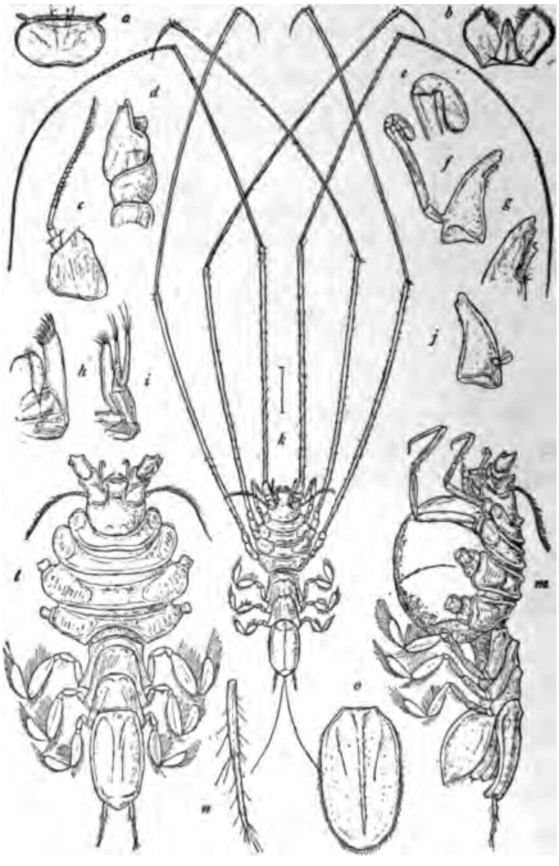

FIG. 545.—MUNNOPSIS TYPICA (AFTER G. O. SARS). *a*, UPPER LIP. *b*, LOWER LIP. *c*, FIRST ANTENNA. *d*, PART OF SECOND ANTENNA. *e*, END OF MANDIBULAR PALP. *f*, LEFT MANDIBLE. *g*, TIP OF LEFT MANDIBLE. *h*, FIRST MAXILLA. *i*, SECOND MAXILLA. *j*, RIGHT MANDIBLE. *k*, DORSAL VIEW OF MALE. *l*, DORSAL VIEW OF FEMALE. *m*, LATERAL VIEW OF FEMALE. *n*, UROPOD. *o*, FEMALE OPERCULUM.

Head with the anterior portion produced in the middle in a wide

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[a] Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, 1901, p. 33-34.

rostrum which is truncate in front. On either side of the rostrum there is an emargination for the reception of the basal articles of the first pair of antennæ. Eyes wanting. Two small spines are situated on the posterior margin, one on either side of the median line. The first pair of antennæ have the basal articles large and dilated. The second article is very small. The third article is about half as long as the second. The flagellum is composed of about twenty-nine articles and extends to the middle of the second thoracic segment. The second pair of antennæ have the first three articles short and about subequal; the fourth article is equal in length to the first three taken together; the fifth is eight times longer than the fourth article; the sixth is about as long as the fifth. The flagellum is composed of numerous articles. The second pair of antennæ are many times longer than the body.

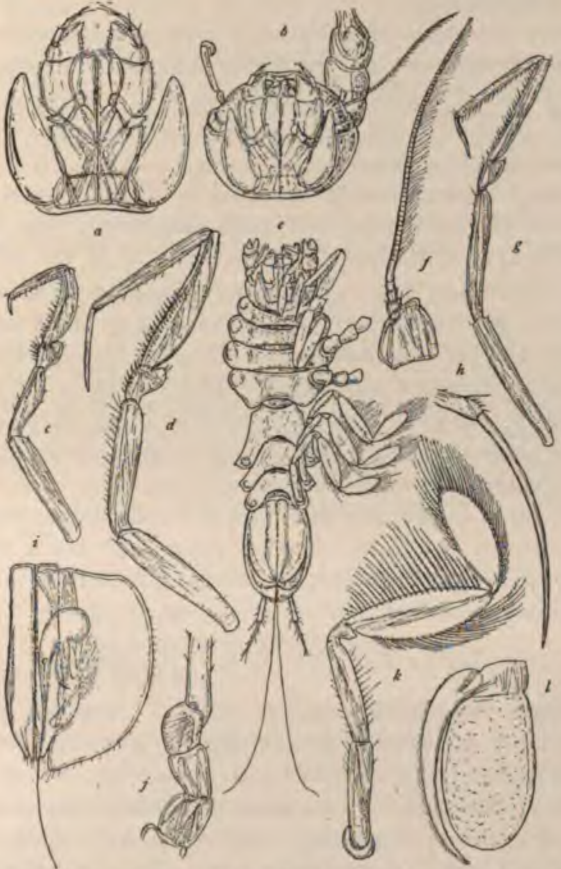

FIG. 546.—MUNNOPSIS TYPICA (AFTER G. O. SARS). *a*, MAXILLIPEDS. *b*, HEAD (VENTRAL VIEW). *c*, FIRST LEG OF MALE. *d*, SECOND LEG OF MALE. *e*, VENTRAL VIEW OF MALE. *f*, FIRST ANTENNA OF MALE. *g*, SECOND LEG OF FEMALE. *h*, EXTREMITY OF THIRD LEG. *i*, FIRST AND SECOND PLEOPODS OF MALE. *j*, THIRD LEG OF MALE. *k*, FIFTH LEG OF MALE. *l*, THIRD PLEOPOD OF FEMALE.

The first two segments of the thorax are about equal in length. The third and fourth are slightly longer. The segments increase a little in width from the first to the fourth. The last three segments are abruptly narrower than the first four. The fifth, sixth, and seventh are equal in length, and the last two bear each two spines near the anterior margin, one on either side of the median line. The post-lateral angles of the fifth and sixth segments are produced in a small small spine on either side.

The abdomen is composed of a single segment, narrow, elongate, with the sides rounded and the posterior margin triangular between the small post-lateral angles. At the base of the segment is a small median spine. The uropoda are simple, single-branched, with each branch composed of two articles.

The legs are differentiated in two series. The four anterior pairs are ambulatory; the three posterior pairs natatory. The legs of the first four pairs are of different lengths. Those of the first pair are the shortest, the second pair being somewhat more elongated. The third and fourth pairs are greatly elongated, being many times longer than the body, the basis, ischium, and merus being short, the carpus and propodus enormously elongated. The carpus is 13 mm. long. (In a larger specimen it is 21 mm. long and the propodus 26 mm. long.) The last three pairs of legs are natatory, with the carpus and propodus enlarged and fringed with long hairs.

The operculum of the female has a longitudinal median keel or crest. The fifth segment of the thorax on the ventral side has a conspicuous median spine. There is a smaller one on the ventral side of the sixth segment also.

79. Genus EURYCOPE G. O. Sars.[a]

Body compact, depressed, oval in outline. Anterior division of thorax less sharply marked off from posterior division.

Head moderately large, deeply emarginate on either side of a frontal process. First pair of antennæ with multi-articulate flagellum. Second pair of antennæ elongated. Mandibles with molar expansion and cutting edge divided into strong teeth.

Four anterior segments of thorax short, subequal, transversely excavated dorsally; the three posterior segments very large and broad, convex.

First pair of legs shorter than three following pairs, which are subequal and very much elongated; natatory legs of similar structure with dactylus distinct, and carpus and propodus expanded. Uropoda small, double-branched, branches uniarticulate.

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 144.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS EURYCOPE.

a. Front of head produced to an acute rostriform projection. Base of head without short transverse ridge. First, second, third, and fourth segments smooth, and produced on each side to acute, anteriorly pointed lappets. Three posterior segments smooth, with antero-lateral angles acutely produced. Caudal segment large, semioval in form, edges evenly curved, and perfectly smooth. *Eurycope cornuta* G. O. Sars

a′. Front of head has appearance of rostral point caused by frontal margin extending between antennulæ. Base of head with short transverse, tubercular ridge; two oblong, low tubercles situated behind peduncles of antennulæ. First segment of thorax with transverse groove. Second, third, and fourth segments have deep transverse depressions, with a sharp spine on anterior portion of each segment, and a compressed protuberance on the posterior portion. Antero-lateral angles of each of these segments produced in short, sharp spines. Epimera of first segment has a single spine, of three following segments two spines each. Three posterior segments of thorax have each two spines, one on either side of median line. Spine present at base of abdomen. At extremity of terminal segment is a spine, on either side of which is a lateral triangular spine.... *Eurycope caribbea* Benedict

EURYCOPE CORNUTA G. O. Sars.

Eurycope cornuta G. O. SARS, Chr. Vid. Selsk. Forhandl., 1863, p. 5, 1864.

Eurycope robusta HARGER, Am. Jour. Sci. (3), XV, 1878, p. 375; Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 332–334, pl. III, fig. 15.—HANSEN, Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 195–196.

Eurycope cornuta SARS, Crust. Norway, II, 1899, p. 145, pl. LXIV.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 301; Proc. U. S. Nat. Mus., XXIII, 1901, p. 558.

Localities.—Gulf of St. Lawrence; Atlantic coast of North America; also coast of Norway; Skagerak; Umanakfjord, Greenland; Kara Sea; latitude 71° 10′ north, longitude 58° 56′ west.

Depth.—50 to 400 fathoms.

"Body oblong oval in outline, being more than twice as long as it is broad, and with the anterior division not attaining half the length of the posterior. Cephalon with the lateral corners pointed, front produced to an acute, rostriform projection, which, however, does not extend to the end of the basal joint of the superior antennæ. The four anterior segments of mesosome comparatively short, and produced on each side to acute, anteriorly pointed lappets. The three posterior segments of mesosome of nearly equal size, and distinctly defined, antero-lateral corners acutely produced. Caudal segment very large, nearly as long as the two preceding segments combined, semi-oval in form, edges evenly curved and perfectly smooth, antero-lateral corners projecting. Superior antennæ in male fully half the length of the body, in female somewhat shorter, flagellum very slender and flexible, being composed of twenty in female, in male of about fifty articulations, carrying delicate sensory filaments. Inferior antennæ more than times as long as the body, penultimate joint of the peduncle clothed everywhere with adpressed spines, some of which, attached to the inner edge and tip, are stronger than the others. Epignath of maxillipeds securiform, outer edge angularly produced. First pair of legs with the propodus much shorter than the carpus, both simple, linear, and clothed with short bristles, dactylus very small; the succeeding pairs very slender, somewhat exceeding the body in length. Natatory legs with the carpal joint cordiform, propodal one of about the same length, but somewhat narrower, oblong oval, dactylus scarcely exceeding half the length of the former. Female operculum subpentagonal in form, and distinctly carinated along the middle; male operculum transformed in the usual manner. Uropoda with the rami subequal in length, the outer one narrower than the inner. Color of the whole dorsal face light reddish brown. Length of adult male 4 mm."—G. O. SARS.[a]

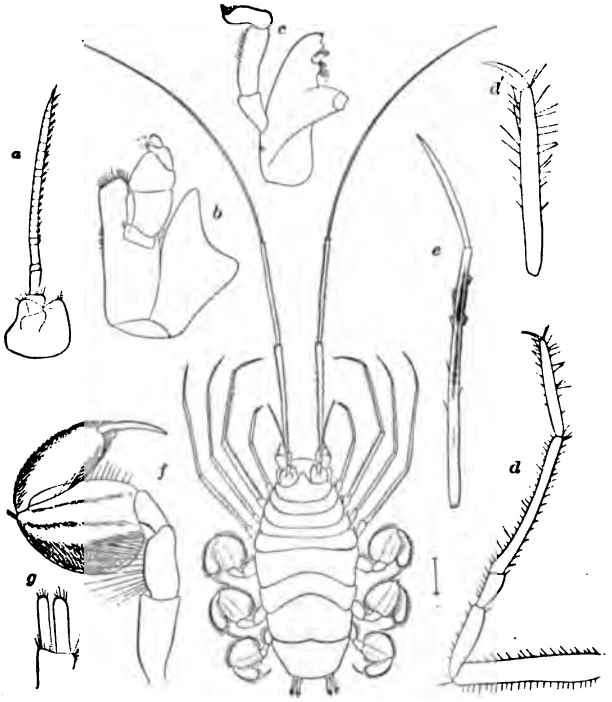

FIG. 547.—EURYCOPE CORNUTA (AFTER HARGER). FEMALE. × 6. *a*, FIRST ANTENNA. × 20. *b*, MAXILLIPED. × 20. *c*, MANDIBLE. × 20. *d*, FIRST LEG. × 20. *d'*, PROPODUS AND DACTYLUS OF SAME. × 38. *e*, PROPODUS AND DACTYLUS OF SECOND LEG. × 20. *f*, SIXTH LEG. × 20. *g*, UROPOD. × 20.

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[a] Crust. of Norway, II, 1899, p. 145.

EURYCOPE CARIBBEA Benedict.

Eurycope caribbea Benedict, in Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 558–560.

Locality.—Windward Islands, West Indies.

Depth.—687 fathoms.

The head is much wider than long. From the point between the antennulæ a depression curves backward and outward to the post-lateral margin. On the base of the head is a short, transverse, tubercular ridge. Two oblong, low tubercles are situated closely behind the peduncles of the antennulæ. The sides of the head are swollen. The peduncles of the antennæ and antennulæ occupy a space inclosed by the front and sides of the head; the margin surrounding these appendages is strongly raised.

The front of the head running between the antennulæ has the appearance of a rostral point; here the raised margins unite in the narrowest place and then immediately diverge and extend downward perpendicularly and around underneath the appendages, where they meet and lap with the produced and bent antero-lateral projections. The first joint of the peduncles of the antenna is very stout, with numerous depressions and prominences; the fourth segment is very long; the terminal portions are broken in all the specimens. The first joint of the peduncle of the antennula is excavated on one side to receive the curvature of the antennal peduncle; the other segments of the peduncle are very small; the flagellum is long and slender, with a great number of articles.

The first segment of the thorax is very narrow; nearly the whole surface is occupied by a transverse groove; on the median line and posterior ridge is a prominent granule; the antero-lateral angles of this segment are rounded. The second, third, and fourth segments are also short and have deep transverse depressions which are much narrower than the one in the first segment; on the median line of these segments the space between the groove or depression and the anterior margin is occupied by the compressed base of a sharp spine which is directed forward; between the depression and the posterior margin is a compressed protuberance; between the protuberances the transverse groove runs as a narrow cut rounded and enlarged at the bottom. The antero-lateral angles of the second, third, and fourth segments are produced forward in short, sharp spines.

The epimera of the four anterior segments have projecting spines; the first having a single spine, the other three having two spines each. The three posterior segments of the thorax are very much the same as in *E. fragilis;* the spines on either side of the median line decrease in size successively.

The spine on the base of the abdomen is short; there are two conspicuous granules nearly in the center and bottom of the two longitudinal depressions. The extremity of the abdomen is formed by a decurved spine; the upper surface of the spine is concave; on either side of the base of the terminal spine is a lateral triangular spine; these lateral spines do not in any measure curve forward, as is the case with *E. fragilis*.

On the median line of the ventral surface of the thorax there is a sharp, curved spine on the first segment, prominent longitudinal ridges on the second, third, and fourth segments, and a spiny tubercle followed by four longitudinal ridges. The ridges are separated by transverse grooves on the coalesced fifth, sixth, and seventh segments.

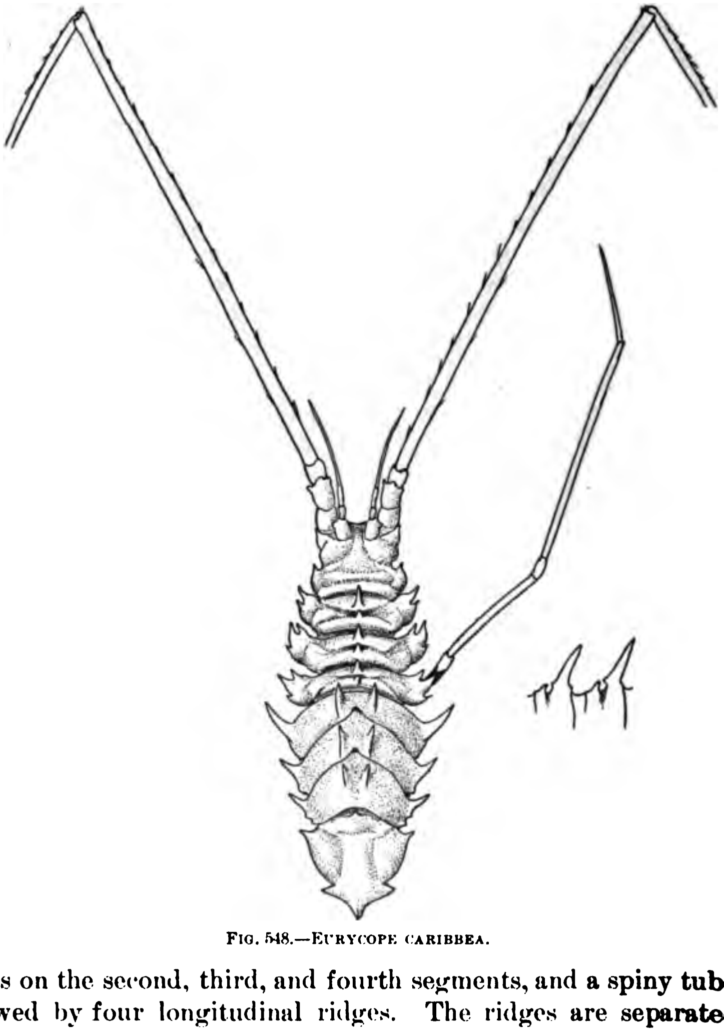

FIG. 548.—EURYCOPE CARIBBEA.

Type.—Cat. No. 23911, U.S.N.M.[a]

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[a] This description is from Doctor Benedict's manuscript.

80. Genus ILYARACHNA G. O. Sars.[a]

Body compact, attenuated behind, with a strongly marked median constriction.

Head very large and broad, transversely truncated in front, lateral parts greatly expanded. First pair of antennæ with flagellum not much elongated. Second pair of antennæ longer than the body. Mandibles with molar expansion; cutting edge not divided; palp feeble.

The first four segments of the thorax crowded together and slightly excavated transversely; last three segments large and convex, the fifth segment scarcely narrower than the preceding segments.

Terminal segment of body narrow and triangular.

First pair of legs small, simple; second pair larger; two following pairs slender and elongated; first two pairs of natatory legs of similar structure; carpus expanded, cordiform, propodus much narrower, oblong, dactylus well developed; last pair much narrower with carpus but slightly expanded, propodus linear, dactylus elongated.

Uropoda small, biarticulate.

ILYARACHNA HIRTICEPS G. O. Sars.

Ilyarachna hirticeps Sars, Forh. Vid. Selsk. i Christiania, 1869, p. 167, 1870.—Hansen, Vid. Medd. naturh. Foren. i Kjøbh., 1887–88, p. 195.—Sars, Crust. of Norway, II, 1899, p. 137, pl. lx.—Richardson, American Naturalist, XXXIV, 1900, p. 301; Proc. U. S. Nat. Mus., XXIII, 1901, p. 560.—Ohlin, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. iv, No. 12, 1901, pp. 35–36.

Localities.—Latitude 66° 32′ north, longitude 55° 34′ west; latitude 71° 10′ north, longitude 58° 56′ west; latitude 72° 41′ north, longitude 59° 50′ west. (Greenland.)

Depth.—100–227 fathoms; 20 to 435 meters (Ohlin).

"Body of a similar appearance to that in the type species, but more than twice as large, and somewhat more robust. Cephalon very broad, with the dorsal face strongly vaulted, and densely clothed with short, stout bristles. Anterior edge of the first four segments of mesosome very distinctly elevated, and minutely crenulated throughout; lateral parts of first segment imperfectly developed. The three posterior segments of mesosome combined about the length of the preceding part of the body; the anterior segment evenly emarginated behind. Caudal segment of a similar form to that in *I. longicornis.* Superior antennæ comparatively short, not nearly reaching to the middle of the penultimate peduncular joint of the inferior ones, basal joint armed along the inner edge with scattered denticles, flagellum, in female, not attaining the length of the last two peduncular joints combined.

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 134–135.

Inferior antennæ scarcely twice as long as the body, penultimate joint of the peduncle armed inside with seven strong spines. Legs, on the whole, resembling in structure those in the type species, though the third and fourth pairs are somewhat less elongated, and the natatory legs more densely fringed with setæ. Uropoda with the proximal joint rather large, and somewhat widening distally, marginal setæ about 20 in number, distal joint very narrow, linear. Color whitish grey. Length of adult female 7½ mm."—G. O. Sars.[a]

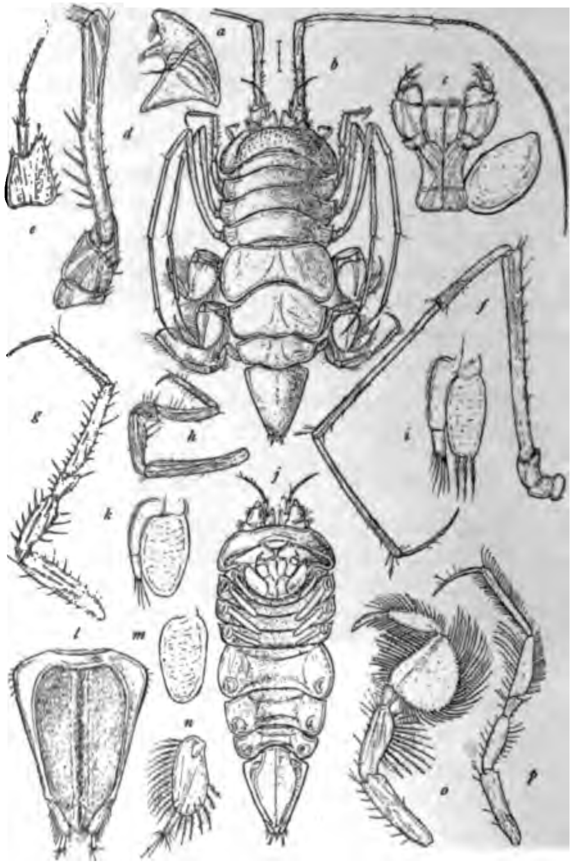

Fig. 519.—Ilyarachna hirticeps (after Sars). *a*, Mandible. *b*, Dorsal view of female. *c*, Maxillipeds. *d*, Second antenna. *e*, First antenna. *f*, Second antenna. *g*, Second leg. *h*, First leg. *i*, Third pleopod. *j*, Ventral view of female. *k*, Fourth pleopod. *l*, Abdomen (ventral view). *m*, Fifth pleopod. *n*, Uropod. *o*, Fifth leg. *p*, Seventh leg.

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[a] Crust. of Norway, II, 1899, p. 137.

V. BOPYROIDEA OR EPICARIDEA.[a]

Parasitic forms, ectoparasites, their hosts being other crustacea. Sexual dimorphism in all the forms is strongly marked.

Female is often very asymmetrical; segmentation is sometimes entirely lost.

Head usually carries two pairs of rudimentary antennæ. Mouth parts are reduced, the mandibles and maxillipeds only being developed.

Rudiments of the second maxillæ sometimes present.

Legs, when present, are prehensile.

Pleopods, in adult, all branchial in character.

Uropoda simple, usually very small, and terminal.

Male, when compared with female, is of diminutive size, and different in appearance from female. Development is in the form of a regressive metamorphosis; there are two and in some forms three larval stages.

ANALYTICAL KEY TO THE FAMILIES OF BOPYROIDEA.

a. Body of female not a simple sac filled with eggs, and having true limbs and some or all of the appendages. Male passing beyond the last larval stage of female into a stage different from it.

  b. Body of female distinctly segmented, more or less asymmetrical, twisted either to right or left. Maxillipeds lamellar, biarticulate, and more frequently exhibiting a small terminal joint. Legs in seven pairs, sometimes obsolete on one side with the exception of the first. Five pairs of incubatory plates present, more or less arching over the ventral surface of the thorax. Pleopoda simple, biramous or triramous, all of the same structure, rarely obsolete. Male with all the segments of the thorax sharply defined. Last larval stage with the flagellum of the second antennæ composed of four articles; legs of uniform structure; uropoda with inner branch shorter than outer. Parasitic on decapodous crustacea .... Family XX. BOPYRIDÆ

  b′. Body of female perfectly symmetrical, the segmentation, when present, only visible in the middle of the dorsal face. Maxillipeds lamellar, without any terminal joint. Only five pairs of legs present. Incubatory plates comparatively small, sometimes greatly reduced in number, and scarcely at all partaking in the formation of the marsupium, which constitutes two separate cavities bounded by the lateral walls of the body. Pleopoda generally rudimentary or wholly absent. Male with head and first segment of thorax coalesced. Last larval stage with the flagellum of the second antennæ composed of five articles; legs of the first pair shorter and thicker than the others; uropoda with the branches subequal. Parasitic on *Schizopoda*. Family XXI. DAJIDÆ

a′. Body of female forming a simple sac, with no true limbs, and all or most of the appendages lost. Male not different from last larval stage of female, and not passing beyond this stage .... Family XXII. CRYPTONISCIDÆ

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[a] See G. O. Sars for characters of tribe or superfamily, Crust. of Norway, II, 189 pp. 193–194.

Family XX. BOPYRIDÆ.[a]

Body of female distinctly segmented and somewhat asymmetrical.

Both pairs of antennæ rudimentary. Maxillipeds composed of two articles, and very frequently with a small terminal article, the palp: two curved lanceolate appendages at the base represent the epignaths.

Coxal plates usually defined.

There are five pairs of incubatory lamellæ; the first pair is composed of two segments.

Abdomen more or less distinctly defined. Pleopoda simple, biramous, or triramous; sometimes obsolete. Uropoda, when present, simple, lanceolate.

Legs usually in seven pairs, sometimes absent on one side with the exception of the first; all are similar in structure, short, prehensile.

Male symmetrical. Head rounded in front. All seven segments of thorax distinct. Segments of abdomen sometimes distinct, sometimes united. Legs similar in structure, all prehensile.

Parasitic on decapods.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY BOPYRIDÆ.

a. Body of female with one side greatly swollen and much longer than other side. Abdomen composed of only five segments. Only first leg present on larger side; others absent. Coxal plates only visible on shorter side. Marsupial plates largely developed on longer side of body, and inclosing the entire incubatory cavity; incubatory lamellæ of shorter side small.

Genus *Phryxus* Rathke

a'. Body of female with neither side swollen. Abdomen usually composed of six segments. All the legs of both sides present.

b. Abdomen of female with the lateral parts or pleural lamellæ elongated, digitate.

c. All six segments of the abdomen with the pleural parts elongated, digitate. Male with the lateral parts of the segments of the abdomen or pleural lamellæ elongate .... Genus *Ione* Latreille

c'. Only the five anterior segments of the abdomen with the pleural parts elongated, digitate. Male with the lateral parts of the segments of the abdomen not elongate.

d. Female without median dorsal tubercles on sixth and seventh segments of thorax. Exopods present on all seven pairs of legs. Uropoda of male filiform .... Genus *Leidya* Cornalia and Panceri

d'. Female with median dorsal tubercle on sixth and seventh thoracic segments. Exopods not developed on any of legs. Uropoda of male represented by two bunches of stiff hairs.

Genus *Grapsicepon* Giard and Bonnier

b'. Abdomen of female with the lateral parts or pleural lamellæ not elongated or digitate.

c. Lateral parts or pleural lamellæ of abdomen of female produced lamellarly.

d. Uropoda in female double-branched. Abdomen in male with segments fused .... Genus *Munidion* Hansen

d'. Uropoda in female single-branched. Abdomen in male with segments distinct.

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 195–196.

e. Sixth abdominal segment in male with post-lateral angles produced in long processes.............................Genus *Cryptione* Hansen

e′. Sixth abdominal segment in male with post-lateral angles not produced in long processes..........................Genus *Pseudione* Kossmann

c′. Lateral parts or pleural lamellæ of abdomen of female rudimentary or absent.

d. Pleopods present in female.

e. Some or all of pleopoda in female tri-ramous.

f. All the pleopoda in female tri-ramous. Sixth segment of thorax greatly longer than any of others. Uropoda in female oval, with a small conical process between them........Genus *Stegophryxus* Thompson

f′. First three pairs of pleopods tri-ramous; last two pairs bi-ramous. Sixth segment of the thorax not greatly longer than any of the others. Uropoda elongated, with no process between them.
Genus *Stegias* Richardson

e′. None of pleopoda tri-ramous in female.

f. Pleopoda bi-ramous in female.

g. Uropoda present in female.

h. Uropoda bi-ramous in female...........Genus *Bathygyge* Hansen

h′. Uropoda simple, single-branched in female.

i. Both branches of pleopoda in adult female similar in size and shape, narrow, elongated. Male with segments of abdomen distinct and with a pair of elongated appendages to each of the first five segments. Uropoda present in male, single-branched. First abdominal segment in both sexes furnished with two dorsal papillæ..........Genus *Phyllodurus* Stimpson

i′. Branches of pleopoda in adult female unlike; outer branch narrow, elongated; inner branch oval, small. Male with segments of abdomen fused and without any appendages to the abdomen; without uropoda. First abdominal segment in both sexes not furnished with two dorsal papillæ.

j. Posterior lobe of lateral margins of all the segments of the thorax more or less produced into processes. Abdomen of male narrow, tapering, not furnished with dorsal tubercle.
Genus *Argeia* Dana

j′, Posterior lobe of lateral margins of thoracic segments not produced into processes. Abdomen of male large, rounded, and furnished with a prominent median dorsal tubercle near the base......................Genus *Pararyeia* Hansen

g′. Uropoda wanting in female.

h. Segments of abdomen fused in male. Segments of abdomen distinct in female............Genus *Probopyrus* Giard and Bonnier

h′. First three segments of abdomen distinct in male; last three segments fused. First four segments of abdomen distinct in female; last two segments fused ....Genus *Bopyriscus*, new genus

f′. Pleopoda simple, single-branched in female.
Genus *Bopyrina* Kossmann.

d′. Pleopoda wanting in female....................Genus *Bopyroides* Stimpson

81. Genus PHRYXUS Rathke.[a]

Abdominal parasites.

Body of female very asymmetrical, one side being very much larger than the other.

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 214–215.

Segments of thorax distinct on the dorsal surface. Lateral parts of thoracic segments and epimera defined only on the shorter side.

Abdomen consists of five segments only; the fifth or terminal segment is small and narrow, bifid at the tip.

Palp of the maxillipeds wanting.

Incubatory plates of the longer side large and well developed and concealing the entire incubatory pouch; those of the shorter side very small.

Legs of the larger side of the body all wanting, with the exception of the first one.

There are four pairs of single-branched pleopoda, the lamellæ of the longer side of the body being larger than those of the opposite side.

Male with all the segments of the thorax distinct; those of the abdomen fused, though more or less indicated at the sides, on the lateral margins. Uropoda wanting. Pleopoda wanting.

PHRYXUS ABDOMINALIS (Krøyer).

Bopyrus abdominalis KRØYER, Nat. Tidsskr., III, 1840–1841, pp. 102–112, 289–299, pls. I, II; Kongelige Danske Videnskabenes Selskabs naturvidenskabelige og mathematiske Afhandlinger, IX, 1842, p. 263.

Phryxus hippolytes RATHKE, Nova Acta Academiæ Cæsariæ Leopoldino-Carolinæ Naturæ Curiosorum, 1843, p. 40, pl. II, figs. 1–10.

Bopyrus abdominalis KRØYER, Voy. en Scand., Crust., 1849, pl. XXIX, fig. 1.

Phryxus abdominalis LILLJEBORG, Œfvers. Kongl. Vet. Akad. Forh., IX, 1852, p. 11.—STEENSTRUP and LÜTKEN, Vidensk. Meddelelser, 1861, p. 275 (9) 1862.—BATE and WESTWOOD, Brit. Sessil-eyed Crust., II, 1868, p. 234.—NORMAN, Rep. Brit. Assoc., 1869, p. 288; Proc. Royal Soc. Lond., XXV, 1876, p. 209.—MIERS, Ann. Mag. Nat. Hist. (4), XIX, 1877, p. 65 (15).—SMITH in HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 158.—HARGER, Rep. U. S. Fish Comm., 1880, Pt. 6, p. 312.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 196.—AXEL OHLIN, Akademisk Afhandling, XXII, 1895, pp. 18–19; Bihang till K. Svenska Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 38–39.—SARS, Crust. of Norway, II, 1899, pp. 215–217, pls. XC, XCI.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 577; XXVII, 1904, pp. 58–59; Bull. U. S. Fish Comm., XXIV, 1905, p. 220.

Localities.—Circumpolar in distribution.

Atlantic coast localities: Massachusetts Bay, on *Pandalus borealis*, *Spirontocaris spinus*, *S. liljeborgii*, and *Pandalus montagui;* Cashes Ledge, Gulf of Maine, on *Pandalus borealis* and *S. pusiola;* Georges Bank on *Pandalus leptocerus;* Halifax, Nova Scotia, on *S. pusiola*, *S. spinus*, and *S. liljeborgii;* northeastern part of Grand Bank on *S. gaimardii* and *S. gibba;* Cape Cod on *P. montagui*, *P. leptocerus*, *S. liljeborgii*, *S. pusiola*, and *S. polaris;* Grinnell Land, Discovery Bay, Greenland, Cape Dudley Digges on *S. phippsii* and *S. polaris;* Inglefield Gulf on *S. polaris;* latitude 73° 48′ north, longitude 80° 30′ west, on *S. polaris;* latitude 64° 56′ north, longitude 66° 18′ west, on *S. phippsii;* off Marthas Vineyard, on *Pandalus leptocerus* and *S. lilje-*

borgii; Casco Bay, Maine, on *P. borealis;* West Greenland; North Greenland; Baffin Land; East Greenland.

Pacific coast localities: Admiralty Inlet, Puget Sound, Washington, on *Spirontocaris grœnlandica;* off North Head, Akutan Island, Alaska, on *S. arcuata;* Straits of Fuca, between Washington and Vancouver Island, on *S. townsendi;* Admiralty Inlet, Puget Sound, Washington, on *S. tridens;* Washington Sound, Straits of Fuca, Washington, on *S. tridens;* off Queen Charlotte Sound, British Columbia, on *S. macrophthalma;* off Yahwhit Head, Washington, on *S. macrophthalma;* Iliuliuk Harbor, Unalaska, on *S. suckleyi;* Arctic Ocean on *S. gaimardii belcheri* (Bell); Plover Bay, East Siberia, on *S. polaris* (Sabine); Alask on *S. polaris* (Sabine); off Cape Strogonoff, Alaska, on *S. fabric*

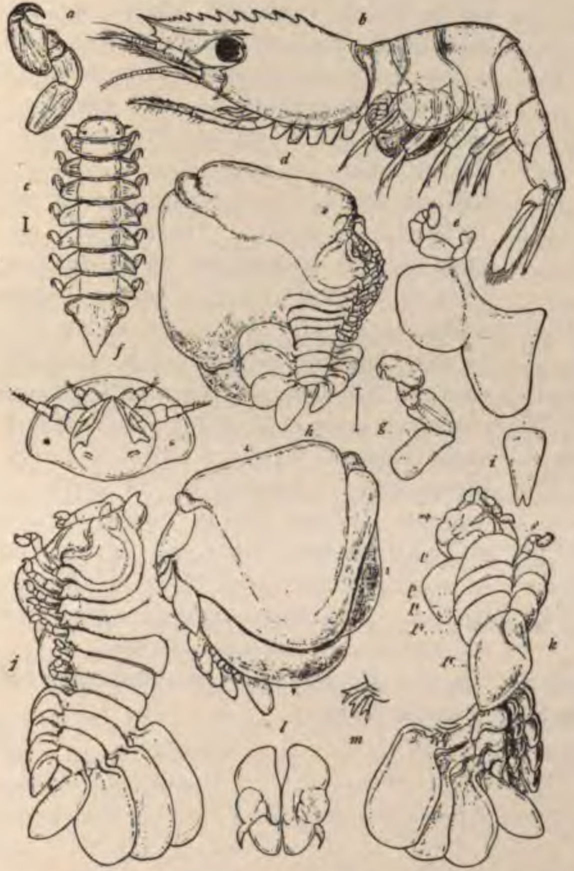

Fig. 550.—Phryxus abdominalis (After Sars). *a*, Leg of male. *b*, Specimen of spirontocaris lilljeborgii infested with parasite. *c*, Male (dorsal view). *d*, Dorsal view of female. *e*, First leg of female. *f*, Head of male (ventral view). *g*, Fourth leg of female. *h*, Ventral view of female. *i*, Last segment of abdomen of female. *j*, Right part of body of female. *k*, Same (ventral side). *l*, Maxillipeds. *m*, Fifth to seventh rudimentary legs.

(Krøyer); off Shumagin Bank, Alaska, on *S. biunguis* Rathbun; off Point Arena, California, on *S. macrophthalma;* Straits of Fuca on *S. townsendi* Rathbun; Philippine Islands on *Plesionika semilævis* (according to Spence Bate);[a] Gulf of Georgia, off Nanaimo, Vancouver Island, British Columbia, on *Spirontocaris bispinosa* Holmes; Admiralty Inlet, vicinity of Port Townsend, on *Spirontocaris tridens* Rathbun; vicinity of Naha Bay, Behm Canal, southeast Alaska, on *Spirontocaris macrophthalma* Rathbun; Uyak Bay, Kadiak Island, on *Spirontocaris suckleyi* (Stimpson); latitude 66° 30′ north, longitude 54° 50′ west, on *Pandalus montagui* Leach; latitude 66° 32′ north, longitude 55° 34′ west, on *Spirontocaris spinus* (Sowerby); latitude 66° 45′ north, longitude 59° 30′ west, on *Spirontocaris spinus;* Ikertokfjord on *Spirontocaris spinus;* latitude 66° 56′ north, longitude 54° 45′ west, on *Spirontocaris spinus;* latitude 67° 51′ north, longitude 55° 15′ west, on *Spirontocaris spinus;* latitude 69° 54′ north, longitude 55° 34′ west, on *Spirontocaris spinus;* Upernavik on *Spirontocaris gaimardii* Milne Edwards and *Spirontocaris phippsii* Krøyer; Grinnell Land, Franklin Pierce Bay, or latitude 79° 29′ north; Cape Napoleon, or latitude 79° 38′ north, on *Spirontocaris polaris* (Sabine); Discovery Bay, or latitude 81° 44′ north, on *Spirontocaris polaris* (Sabine); Greenland on *Spirontocaris spinus*, *Spirontocaris phippsii*, and *Spirontocaris gaimardii.*

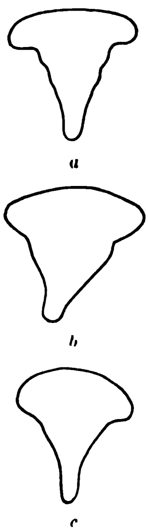

FIG. 551.—PHRYXUS ABDOMINALIS. ABDOMEN OF MALE FROM SPECIMENS FOUND ON: *a*, PANDALUS LEPTOCERUS FROM OFF BLOCK ISLAND. × 27½. *b*, PANDALUS LEPTOCERUS FROM MARTHAS VINEYARD. × 27½. *c*, PANDALUS LEPTOCERUS FROM OFF BLOCK ISLAND. × 27½.

Also recorded from the British Isles; Scandinavian coast; Spitzbergen; Kara Sea; coast of Norway.

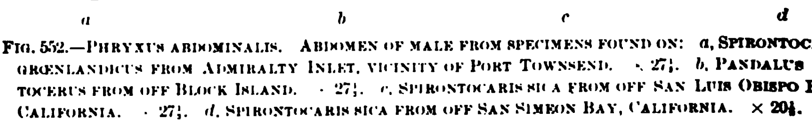

FIG. 552.—PHRYXUS ABDOMINALIS. ABDOMEN OF MALE FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS GRŒNLANDICUS FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 27½. *b*, PANDALUS LEPTOCERUS FROM OFF BLOCK ISLAND. × 27½. *c*, SPIRONTOCARIS SICA FROM OFF SAN LUIS OBISPO BAY, CALIFORNIA. × 27½. *d*, SPIRONTOCARIS SICA FROM OFF SAN SIMEON BAY, CALIFORNIA. × 20½.

Depth.—5 to 351 fathoms.

Body of female very asymmetrical. Length 9 mm. Width 7 mm.

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[a] Challenger Report, 1888: Crustacea Macrura, XXIV, pp. 645–646.

Head as wide as long, 1½ mm. : 1½ mm., with the anterior margin straight and produced at the sides in small lateral processes. Posterior margin rounded. Head deeply set in thorax. Eyes absent.

The seven segments of the thorax are well defined on one side and in the dorsal region. On the opposite side, however, they merge into and are continuous with the large marsupial pouch which occupies the entire ventral and lateral portion of the individual.

All seven legs are present on the side of the body which has the segments well defined. On the opposite side, however, only the first leg is present. Ovarian bosses are present on the first four segments on the shorter side. Lateral to these are the epimera which occupy the whole of the lateral margin. Epimera are also present on the last three segments on the shorter side. Neither ovarian bosses nor epimera are present on the longer side of the body.

The abdomen is composed of five segments, all distinct. The fifth segment is very small and tapers posteriorly to a pointed extremity.

There are no uropoda. There are four pairs of double-branched pleopoda. The outer branches are large oval, elongated lamellæ, leaf-like in shape and larger on the larger side of the body, where they lie upon the dorsal surface of the marsupium in its expanded lateral portion. The inner branches are small. There are five pairs of incubatory lamellæ, of which those of one side are large and greatly developed, occupying the whole of the lateral and ventral side of the body and completely inclosing the eggs, while those of the shorter side of the body are very small and much reduced in size.

The male is narrow, elongate, 3 mm. long and 1 mm. wide. The head is rounded anteriorly and the eyes are present. The first pair of antennæ consist of three articles. The second pair of antennæ are composed of four or five articles.

The seven segments of the thorax are well defined, and have the lateral margins straight. All the segments of the abdomen are coalesced in a single segment which tapers to a pointed extremity. There are no uropoda or pleopoda.

The specimen described is found parasitic on *Spirontocaris townsendi* Rathbun.

82. Genus IONE Latreille.

Female with the lateral parts or pleural lamellæ of the abdomen elongated, digitate.

There are usually five pairs of double-branched pleopoda. The uropoda consist of two elongate simple curved processes, with margins smooth, not digitate. Male with the segments of the abdomen more or less fused; lateral parts or pleural lamellæ in the form of narrow elongated processes.

Branchial parasites.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS IONE.[a]

a. Lateral parts or pleural lamellæ of the abdominal segments in female twice as long as the uropoda. Basal article of legs with an elevated eminence the margin of which is irregular. Abdominal segments in male completely fused. *Ione brevicauda* Bonnier

a′. Lateral parts or pleural lamellæ of the abdominal segments in the female not longer than the uropoda. Basal article of legs with two elevations or carinæ the margins of which are regular. Abdominal segments in male less completely fused .... *Ione thompsoni* Richardson

IONE CORNUTA Spence Bate.

> *Ione cornuta* SPENCE BATE, Proc. Zool. Soc. London, 1864, p. 668; Lord's Naturalist in British Columbia, II, 1866, p. 282.—BATE and WESTWOOD, British Sessile-eyed Crustacea, II, 1868, p. 253.—GIARD and BONNIER, Travaux de l'Institute Zool. de Lille et du Laboratoire Maritime de Wimereux, V, 1887, p. 77.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 869; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 338; American Naturalist, XXXIV, 1900, p. 308.—BONNIER, Trav. de la Station Zool. de Wimereux, VIII, 1900, pp. 245–247.—RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 75.

Localities.—Esquimault Harbor, British Columbia, on *Callianassa longimana;* Vancouver Island.

"Mas: pleonem terminatum rotunde.

"The male differs from the description of the European species chiefly in having the caudal extremity terminating obtusely and in having shorter antennæ.

"Fem., subequilateralis, lateralia cornua cephalonis habens recurvata, pleopoda longa et arborea.

"The female has the antero-lateral horn-like process of the cephalon curved posteriorly. The pereion is not quite equilaterally developed. The coxæ of the four anterior pairs of the pereiopoda are round, and all attached to the antero-lateral margin of the segments of the pereion. The coxæ of the three posterior are the larger, and produced posteriorly to a point. The pleopoda are long and fringed with arborescent branchiæ.

"This is the only species known besides that taken by Colonel Montagu on the southern coast of England.

"Length, male, ¼; female ⅜ of an inch.

"Taken attached to the branchia of *Callianassa longimana.*"—SPENCE BATE.[b]

"This species is much larger than that of the European form and differs from it chiefly in having the lateral extremities of the somite or segment which bears the antennæ, posteriorly produced up each side of the head, after the manner of lateral horns. All the pereiopoda are short and powerfully subchelate. The branchial appendages are arborescent and pendulous; to the inner extremity of which two appendages are attached, each of which inversely increases as the other decreases; so that one is largest nearest the pereion of the animal, while the other is longest nearest the caudal extremity. To the posterior of these the male animal attaches itself by means of the seventh pair of pereiopoda." SPENCE BATE.[a]

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[a] *Ione cornuta* Spence Bate is not included in the key because the description of this form does not give details as to the characters, and because it is very probable that the form described by Bonnier is identical with *Ione cornuta.*

[b] Lord's Naturalist in British Columbia, II, 1866, p. 282.

IONE BREVICAUDA Bonnier.

Ione brevicauda BONNIER, Trav. de la Station Zool. de Wimereux, VIII, 1900, pp. 248–250, pl. IV.

Localities.—California, at San Francisco, on *Callianassa* William Stimpson; Gulf of Georgia.

The adult female measures 6.7 mm. and differs at first sight from *Ione thoracica* and *Ione vicina* in the compact form of the body and the large dimensions of the dorsal surface, which is perfectly symmetrical; the pleural lamellæ of the first thoracic segments do not present the differences in dimensions of the other species of the genus; those of the first two segments are, on the right as on the left, almost equal and do not extend backward beyond the following segment; those of the two following segments are smaller, and are inserted in a small and narrow portion of the pleural margin of the segment, on the anterior part; finally the pleural lamallæ of the last three segments, and especially those of the sixth and seventh, are not longer than the prolongations of the entire lateral margin, the width of which they have, with, moreover, some small sinuses in their inferior margin.

The first four thoracic segments, moreover, have each a pair of pleural bosses, regularly rounded and very distinct. The appendages of the head do not present anything of importance; one can only point out that the palp of the maxillipeds is exceedingly reduced and is merely a small lamella inserted in a notch and terminating in three little hairs, and also that the inferior lamella of the head is relatively much larger and that the secondary lamellæ are more developed; the third, the inner lamella, exists also in this American species. The legs are identical with those of *I. thoracica*, except perhaps the irregular elevations (or carinæ) of the basis are more accentuated. The oostegites (or incubatory lamellæ) are identical with those of the other species and, as with them, are covered on their external parts with simple or bifid hairs having rough extremities; the only difference to be noted is that, in the first oostegite (lamella), the digitations of the inner ridge are much smaller and more numerous and there is also a difference in the arrangement of the hairs on the inferior margin.

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[a] Brit. Assoc. Adv. Sci., 1863, XXXII, p. 98.

The ventral surface of the last segments of the thorax and the first segments of the abdomen has longitudinal keels as is usual.

The abdomen is also very characteristic; the prolongations of the

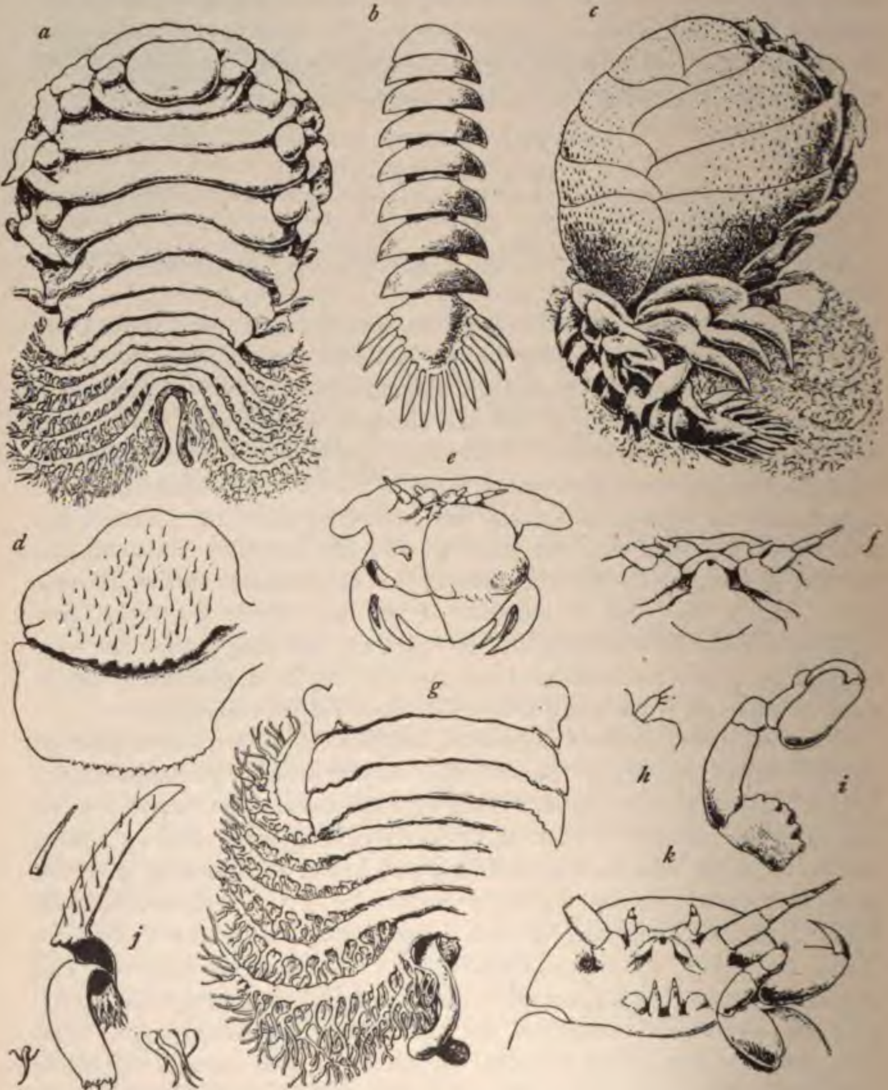

FIG. 553.—IONE BREVICAUDA (AFTER BONNIER). *a*, DORSAL VIEW OF ADULT FEMALE. *b*, DORSAL VIEW OF MALE. *c*, VENTRAL VIEW OF FEMALE. *d*, FIRST INCUBATORY LAMELLA. *e*, VENTRAL VIEW OF HEAD OF FEMALE (RIGHT MAXILLIPED REMOVED). *f*, BUCCAL ROSTRUM AND ANTENNÆ OF FEMALE. *g*, ABDOMEN OF FEMALE (DORSAL VIEW). *h*, EXTREMITY OF MAXILLIPED. *i*, LEG OF FEMALE. *j*, LONGITUDINAL SECTION OF VENTRAL PORTION OF FIRST INCUBATORY LAMELLA. *k*, HEAD OF MALE (VENTRAL SIDE).

pleural lamellæ are here very much more developed than in the European spe [illegible] hey increase in length from the first to the sixth, which is twice as long as the first; they are like long branches which become narrower toward the distal extremity and they are divided into distinct articles each one of which gives origin, on its inferior margin to long ramified digitations, those near the base being especially long. On the ventral side there are two pairs of bi-ramous pleopods, the branches of which are of equal length, but not of the same width; the inner branches are certainly much larger, especially on the first pairs. The uropoda have the usual form of the other species of the genus, but they are here relatively much shorter and do not reach even half the length of the pleural prolongation of the sixth segment of the abdomen.

The male measures 4.5 mm.; it is relatively large in comparison with the size of its European congeners and does not present any differences except in the form of the pleural prolongations of the abdomen; they are slightly attenuated at their two extremities, especially at the distal extremity. The first three pairs of legs have the dactylus pointed while those of the other pairs are blunt, recalling the form of the corresponding organs in the female.[a]

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[a] The above description is adapted from the following one of Bonnier's:

La femelle adulte (fig. 1 et 2) mesure 6 mm. 7 et diffère à première vue d'*Ione thoracica* et d'*I. vicina* par la forme ramassée du corps et la large dimension de la surface dorsale, qui est parfaitement symétrique; les lames pleurales des premiers somites thoraciques ne présentent pas les inégalités de dimensions des autres espèces du genre; celles des deux premiers sont, à droite comme à gauche, à peu près équivalentes et ne dépassent pas en arrière le somite suivant; celles des deux segments suivants sont plus petites, insérées par une partie rétrécie au bord pleural du somite, sur la partie antérieure; enfin les lames pleurales des trois derniers somites ne sont plus, surtout celles des sixième et septième, que les prolongements de tout le bord latéral dont elles ont la largeur et avec, en plus, quelques petites sinuosités à leur bord inférieur. Les quatre premiers somites thoraciques portent en outre chacun une paire de bosses pleurales régulièrement arrondies et très nette. Les appendices de la tête n'offrent rien de particulier: on peut seulement noter que la palpe du maxillipède est excessivement réduit, ce n'est plus qu'une toute petite lamelle découpée dans une échancrure et terminée par trois petits poils (fig. 5), et aussi que la lame inférieure du céphalon est relativement beaucoup plus large et que les lamelles secondaires sont plus développées; la troisième, la lamelle interne, existe aussi dans cette espèce américaine. Les péreiopodes sont identiques à ceux de *I. thoracica*, sauf peut-être que les éminences irrégulières du basipodite sont plus accentuées (fig. 8). Les oostégites sont identiques à ceux des autres espèces et, comme eux, couverts dans leurs parties externes de poils simples ou bifides à extrémités squameuses: la seule différence à noter est que, dans le premier oostégite, les digitations de la crête interne sont beaucoup plus fines et plus nombreuses (fig. 7) et il a aussi une différence dans l'implantation des poils du bord inférieur (fig. 6). La surface ventrale des derniers somites du péreion et des premiers du pléon est plissée longitudinalement, comme cela se présente d'ordinaire.

Le pléon (fig. 9) est aussi très caractéristique: les prolongements des lames pleurales sont ici bien plus développés que dans les espèces d'Europe et ils croissent de longueur du premier au sixième qui est deux fois plus long que le premier: ce sont des sortes de longues tiges qui vont en s'amincissant vers l'extrémité distale et elles se divisent en de véritables articles distincts dont chacun émet sur son bord inférieur

IONE THOMPSONI Richardson.

Ione thompsoni Richardson, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 75–78.

Locality.—North Falmouth, on *Callianassa stimpsoni.*

Body of female longer than broad.

Head deeply set in thorax, its anterior margin produced in a crenulated border. The antero-lateral lobes of the frontal border extend some distance beyond the sides of the head. The posterior portion of the head is evenly rounded. The first antennæ are three jointed; the second pair are five jointed.

All the thoracic segments are distinct, with distinct epimera ("lames pleurales" of Giard and Bonnier), in the form of large rounded lobes, not elongated. In the first two segments these epimeral lobes occupy the anterior portions of the lateral parts of the segments; in the third segment they are placed about the center of the lateral margin; in the fourth and fifth segments they occupy more of a posterior position; in the sixth and seventh segments they occupy the entire lateral margin. Ovarian bosses are present on the first four segments, along the anterior portion of the segment.

The six segments of the abdomen are distinct, and are produced laterally, each in a pair of elongated and jointed appendages, furnished with numerous mammilliform, branching appendages, originating from the posterior margin and extending downward. Thus there are six pairs of appendages corresponding to the "lames epimeriennes du pleon" of Giard and Bonnier.

The pleopoda consist of four pairs of double-branched appendages and one pair of single-branched appendages.[a] The inner branches of the first four pairs fold over the ventral side, meeting in the median line. These branches are all large and of nearly equal size and thickly

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de longues digitations ramifiées qui le sont d'autant plus qu'elles sont plus près de la base. A la face ventrale (fig. 2) on voit deux paires de pléopodes biramés, dont les rames sont de même longueur, mais non de même largeur: les endopodites sont beaucoup plus larges en effet, surtout sur les premières paires. Les uropodes ont la forme ordinaire des autres espèces du genre, mais ils sont ici relativement beaucoup plus courts et n'atteignent même pas la moitié de la longueur du prolongement pleural du sixième somite du pléon.

Le mâle (fig. 10) mesure 4 mm. 5; il est grand, relativement à la taille de ses congénères d'Europe et il ne présente de différences que dans la forme des prolongements pleuraux du pléon: ils sont légèrement atténués à leurs deux extrémités, surtout à la distale. Les péreiopodes des trois premières paires ont des dactylopodites aigus, tandis que ceux des autres paires sont émoussés et rappellent la forme des organes correspondants dans la femelle.—Jules Bonnier, Travaux de la Station zool. de Wimereux, VIII, 1900, pp. 248–250.

[a] The young female of *Ione thompsoni* has the last pair of pleopoda double-branched, the two branches similar, however. The inner branches of the first four segments are quite different from those of the outer branches, as is true of the adult female, and lie folded over the abdomen as in the adult described.

tuberculate, the first two pairs being somewhat larger than the last two pairs. The outer branches of the first four pairs and the fifth pair of pleopoda consist of narrow, elongated appendages crenulated on their outer margins and thickly tuberculate. The appendages of the sixth abdominal segment, the uropoda, are a pair of simple, cylindrical, elongated lobes, recurved at their extremities, and not reaching beyond the mass of epimeral appendages.

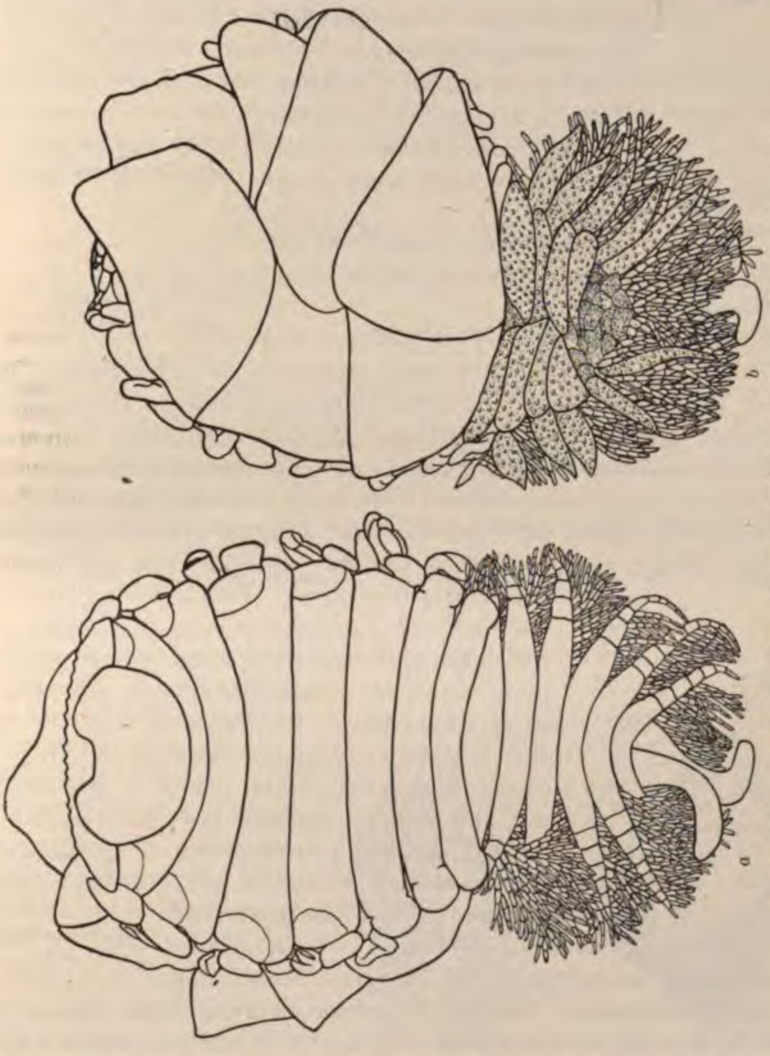

FIG. 554.—IONE THOMPSONI. *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF SAME. ×6.

The incubatory pouch is formed of five pairs of lamellæ, five issuing from one side and five from the other. The first pair are much smaller than the others, and are entirely concealed by the second pair.

The seven pairs of legs are all similar, and terminate in a prehensile hand. There are two expansions or carinæ on the basis of all the legs, the anterior one being only half as long as the other.

Male with all the segments of the thorax distinct. Eyes wanting. Antennæ conspicuous, six jointed. Antennulæ, three jointed. The segments of the abdomen are more or less distinct, all six furnished each with a pair of elongated leaf-like tapering appendages.

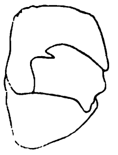
FIG. 555.—IONE THOMPSONI. MAXILLIPED.

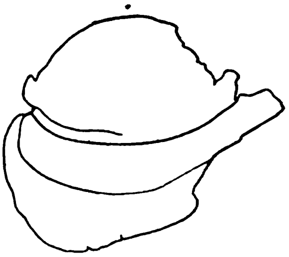
FIG. 556.—IONE THOMPSONI. FIRST LAMELLA OF MARSUPIUM. × 10.

Two specimens were collected by Mr. G. M. Gray at North Falmouth, Massachusetts. They were found on *Callianassa stimpsoni.*

The species is named for Dr. Millett T. Thompson, from whom the specimens were received.

Type.—Cat. No. 29091, U.S.N.M.

This species is apparently very close to *I. cornuta* Spence Bate, from Vancouver Island. It agrees with *I. cornuta* in the absence of the elongated epimeral lobes (lames pleurales), in which both species differ from *I. thoracica* (Montagu). *Ione thompsoni* and *I. cornuta* are both much larger species than *I. thoracica.* In the description of *I. cornuta,*[a] the author says that the coxæ of the three posterior segments of the thorax are larger than the four anterior, and are produced posteriorly to a point. This is not true of *I. thompsoni*, in which the epimera of the three posterior thoracic segments are smaller than those of the anterior segments, although they occupy the entire lateral margin, and they are rounded posteriorly and not produced to a point. Spence Bate also speaks, in reference to *I. cornuta*, of the antero-lateral "horn-like process of the cephalon[b] curving posteriorly." In *I. thompsoni*, these lateral processes or lobes extend out straight at the sides. Bate and Westwood, in describing *I. cornuta*, state that the last pair of inner saccular branches of the pleopoda are almost obsolete. There are but four pairs of inner branches in *I. thompsoni.* The above quoted authors also describe the inner branches of the pleopoda as gradually diminishing in size to the last pair, whereas the outer branches gradually increase in size. This is not true of *I. thompsoni.*

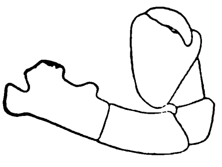
FIG. 557.—IONE THOMPSONI. LEG OF SIXTH PAIR OF ADULT FEMALE. × 11¼.

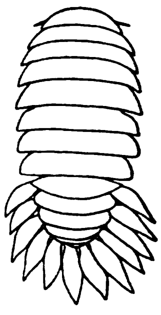
FIG. 558.—IONE THOMPSONI. MALE. × 8.

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[a] Proc. Zool. Soc. London, 1864, p. 668.

[b] British Sessile-eyed Crustacea, II, 1868, p. 254.

83. Genus LEIDYA Cornalia and Panceri.

Abdomen distinctly segmented. Pleural lamellæ or lateral parts of the first five segments of the abdomen lanceolate, finely fringed.

Legs of female terminate in a short, blunt claw.

Exopods present and nearly equal on all seven pairs of legs.

The pleopods are "lanceolate and fringed."

Male has the abdomen distinctly segmented. There are five pairs of simple rudimentary pleopods. Uropoda simple, in the form of two long appendages attached to the sixth abdominal segment.

Branchial parasites.

LEIDYA DISTORTA (Leidy).

Cepon distortus Leidy, Journ. Acad. Nat. Sci. Phila. (2), III, 1855, p. 150, pl. xi, figs. 26–32.

Leidya distorta Cornalia and Panceri, Mem. R. Acad. Sci., Torino (2), XIX, 1858–1861, p. 114.

Cepon distortus Harger, Rep. U. S. Fish Comm., Pt. 1, 1873, p. 573 (279); Proc. U. S. Nat. Mus., II, 1879, p. 157; Rep. U. S. Fish Comm., 1879, p. 157; Pt. 6, 1880, p. 311.—Kossmann, Zool. Ergeb. einer Reise in die Küst. des Rothen Meeres, III, Malacostraca, 1880, p. 122; Mittheil. aus der Zool. Station zu Neapel, III, 1881, first half, p. 182.

Phryxus distortus Walz, Arbeit. aus d. Zoolog. Instit. d. Univers. Wien, IV, 1882, p. 59.

Leidya distorta Giard and Bonnier, Trav. du Labor. de Wimereux, V, 1887, p. 68, fig. 12.

Cepon distortus Richardson, Am. Nat., XXXIV, 1900, p. 309.

Leidya distorta Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 579.

Locality.—Atlantic City, New Jersey, in the branchial cavity of *Uca pugilator*.

"Female: Body compressed and distorted ovoid, white; abdominal scales completely concealing the pinkish white ova. Head prominent, provided with a pair of large oval disks situated posteriorly. Mouth minute, at the summit of a trilobate papilla. Antennæ very small and indistinct. Divisions of the thorax posteriorly strongly costate. Feet in seven pairs, curved forward and downward, ending in a short recurved, abortive hooklet. Abdomen deeply segmented. Branchial appendages lanceolate, fringed.

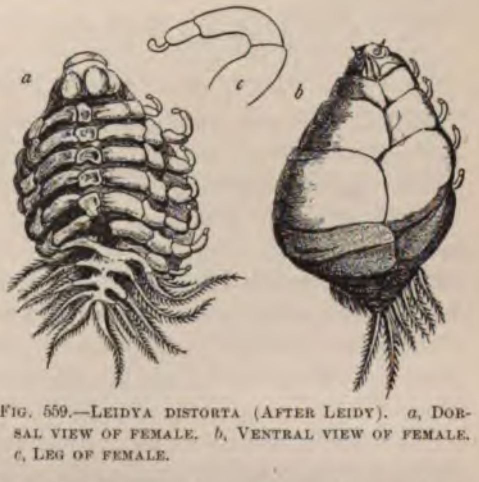

Fig. 559.—Leidya distorta (after Leidy). *a*, Dorsal view of female. *b*, Ventral view of female. *c*, Leg of female.

"Male: Body long and slender, divided into fourteen segments. Head subrotund. Internal antennæ short and robust, 3-jointed; joints spinous. External antennæ long, 7-jointed; the first two joints spinous, the others bristled. First joint of the thorax transversely oblong, the remainder depressed, pyriform in outline. Feet in seven pairs, the ante-penultimate joint spinous, the penultimate joint broad and with the claw recurved. Abdominal segments depressed, pyriform in outline, each provided with a pair of peculiar ventral appendages, and, except the fifth one, with a lateral irregular pigment cell. Caudal segment round, with a pair of divergent appendages. Length of female four lines, breadth three lines; length of male one and a quarter lines."—LEIDY.[a]

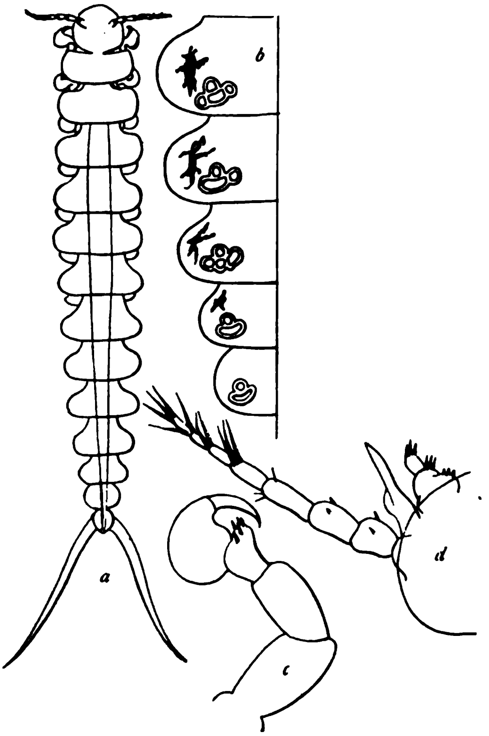

FIG. 560.—LEIDYA DISTORTA (AFTER LEIDY). *a*, DORSAL VIEW OF MALE. *b*, ABDOMINAL SEGMENTS OF MALE WITH PECULIAR APPENDAGES. *c*, RIGHT LEG OF MALE. *d*, HEAD OF MALE WITH ANTENNÆ. ALL MAGNIFIED.

84. Genus GRAPSICEPON Giard and Bonnier.

Female with two median dorsal tubercles, one on the sixth and the other on the seventh thoracic segment.

Five anterior segments of abdomen with the lateral parts or pleural lamellæ produced into long, tapering prolongations, which are digitate. Abdomen distinctly segmented. Pleopoda in five pairs, well developed, double-branched; outer branches similar to the pleural lamellæ of the segments; inner branches in the form of large tubercles.

Uropoda consisting of two elongate lamellæ similar to the outer branches of the pleopoda or the pleural lamellæ of the abdominal segments.

Male with all the segments of the thorax and abdomen distinct. There are five pairs of rudimentary pleopods. The uropoda are represented by two bunches of stiff hairs.

Branchial parasites.

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[a] Journ. Acad. Nat. Sci. Phila. (2), III, 1855, p. 150, pl. xi, figs. 26–32.

GRAPSICEPON EDWARDSII Giard and Bonnier.

Grapsicepon edwardsii GIARD and BONNIER, Compt. Rend. Acad. Sciences, CVII, 1888, p. 1.—HANSEN, Ergebn. d. Plankton Exped. der Humboldt Stiftung, II, 1895, p. 43.—GIARD and BONNIER, Travaux de la Station Zool. de Wimereux, VIII, 1900, pp. 263–266, pls. VIII, IX.

Localities.—Florida stream; also Sargasso Sea.

The adult female has a general globular form, flattened on the dorsal surface and terminated at its posterior extremity by a group of slender appendages with digitate edges; it measures 1.9 mm. from the frontal border to the sixth segment of the abdomen. The head forms a single and projecting mass, which is surrounded anteriorly and on the sides by a large undulating anterior lamina or border; on the inner side are found the very small, three-articulate first antennæ, which are situated some distance apart; the last two articles are furnished with several small hairs having a rough surface; the second pair of antennæ are equally short, the first article is large, half consolidated with the head, and the other four articles decrease in size to the last, which is furnished with several hairs; their surface presents the same appearance as that of the first pair of antennæ. The rostrum is elevated and particularly distinct; from the notched point of the inferior lip one can see the tip of the mandibles projecting, which is in the form of the bowl of a spoon with the edge finely denticulate. The maxilliped possesses an elongated palp terminating in little, short hairs. The inferior margin of the head is cut up on both sides in a pair of little lamellæ of almost equal size, the cuticle of which is rough and the extremity blunt.

The first four thoracic segments are large and are in the form of cushions; on their lateral margins are strong pleural bosses with contours rather indistinct and with a rudimentary pleural lamella; the three other segments are much narrower, their pleural lamella is rather distinct, and the dorsal surfaces of the sixth and seventh segments are elevated in very sharp points in the median line of the body. The ventral side of the thorax is completely hidden by the incubatory cavity, which is very regularly developed; the first of the oostegites (lamellæ) has an inner edge with several large digitations, and its posterior part does not present a margin dentated or notched. The legs are very reduced, which is in correspondence with the almost useless part which they have to play in the fixation of the parasite, firmly maintained in place by all the carapace of the host. The fourth of these appendages is figured; under the rounded lateral margin, the coxa shows a very solid chitinous armature, intended to move the oostegite (lamella), which is attached there by the median nerve; the basis is very large, flattened, and almost square; the ischium is much narrower; the two following articles are fused and the propodus is not much developed; the dactylus has the form of a little, short claw, not reaching the end of the palmary margin of the preceding article.

The abdomen, in the median part, is very short and very slender; its entire size comes from the extraordinary development of its pleural prolongations and of their appendages. The first form long lamellæ which rise parallel toward the anterior part of the body and

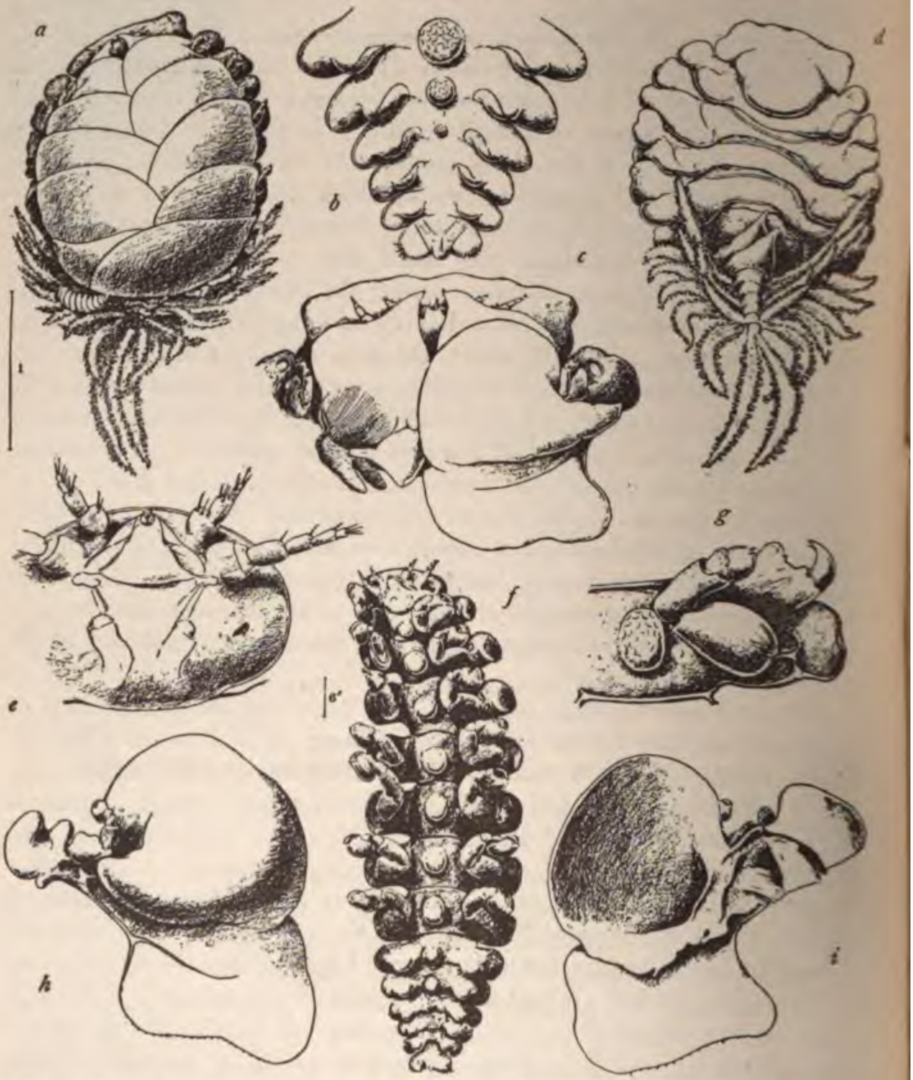

FIG. 561.—GRAPSICEPON EDWARDSI (AFTER BONNIER). *a*, VENTRAL VIEW OF FEMALE. *b*, ABDOMEN OF MALE (VENTRAL VIEW). *c*, VENTRAL VIEW OF HEAD OF FEMALE (FIRST RIGHT INCUBATORY LAMELLA REMOVED). *d*, DORSAL VIEW OF FEMALE. *e*, HEAD OF MALE (VENTRAL SIDE). *f*, VENTRAL VIEW OF MALE. *g*, SEVENTH THORACIC SEGMENT OF MALE (VENTRAL SIDE). *h*, FIRST LEG WITH INCUBATORY LAMELLA. *i*, THE SAME (INNER FACE).

the edges of which are formed of a considerable and dense quantity of long digitations, some of which are subdivided into secondary digitations; these prolongations are especially developed on the first segments of the abdomen; they decrease in length on the last segments. The outer branches of the pleopods present exactly the same form as the pleural parts, but they increase in length in an inverse order, from the first to the fifth segment, where they are the longest; the inner branches are reduced to large tubercles with irregular surface, fixed

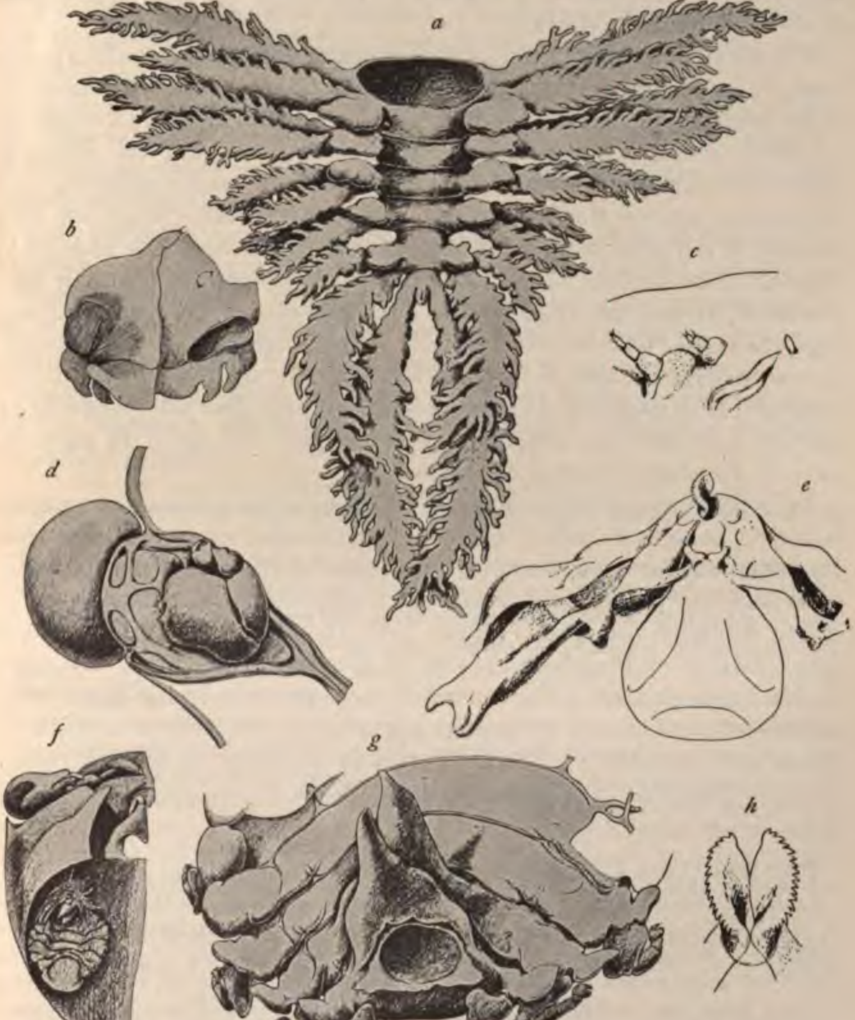

Fig. 562.—Grapsicepon edwardsi (After Bonnier). *a*, Ventral view of abdomen. *b*, Inferior part of head with right maxilliped. *c*, Both antennæ. *d*, Right leg of fourth pair (female). *e*, Rostrum with right mandible in situ. *f*, Parasite in branchial cavity of host. *g*, Last thoracic segments (dorsal view). *h*, Extremities of the mandibles.

to the base of the insertion of the pleopods. The last segment of the abdomen bears only two uropods, of the same conformation as the pleural lamellæ and the outer branches of the pleopoda of the preceding segments, but they are of a length exceeding the longest of these appendages. Turned back and laid on the dorsal surface, they extend to the middle of the thorax.

The male, unknown in the other species of the genus, recalls a great deal, in its general form, that of the genus *Cancricepon*. It measures in its greatest dimension 0.55 mm. The first antennæ are composed of three articles, the second antennæ of five articles, the most of which are furnished with stiff hairs; there are no maxillipeds. In the median line of the thorax are spherical tubercles which are also present in the same place on the first three segments of the abdomen; their external surface is covered with little pectinate scales. The legs are short, robust, and terminate in a pointed claw. The genital openings are visible on both sides of the ventral tubercle of the seventh thoracic segment, and in a clear area lighter than the rest of the cuticle. Rudiments of pleopods are seen on the first five segments of the abdomen, and the uropods are represented on the sixth segment only by two little bunches of stiff hairs.

In general there is but a single adult male on a female; I ought, however, to note as rather frequent the presence of several males on the same female; I have counted just four of them between the pleopods and the pleura, and, a curious thing, all of them having absolutely the same form, they do not have the same size. One of them was a little more than half the size of the largest, the other two were of intermediate size. The ventral bosses appeared in the three individuals of smaller size on the five segments of the abdomen, while in the largest specimen they actually were present only on the first three. It is probable that the number of these bosses decrease with age. The same fact is equally true of *Cancricepon elegans*.[a]

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[a] The above description is adapted from the following one of Bonnier's:

La femelle adulte a une forme générale globuleuse, aplatie sur la surface dorsale et terminée à son extrémité postérieure par un bouquet d'appendices effilés à bords digités; elle mesure, du bord frontal au sixième somite du pléon, 1 mm., 9. La tête forme une masse unique et saillante qui est entourée antérieurement et sur les côtés par une large lame antérieure flottante; à la face interne se trouvait, à une assez grande distance, l'une de l'autre, les antennules très petites et tri-articulées; les deux derniers articles portent quelques petites soies et leur surface est squameuse; les antennes sont également courtes, le premier article est large, à moitié soudé au céphalon et les quatre autres articles diminuent d'importance jusqu'au dernier qui porte quelques soies; leur surface présente le même aspect que celui de l'antennule. Le rostre est proéminent et particulièrement net; de la pointe échancrée de la lèvre inférieure on voit sortir l'extrémité des mandibules qui est en forme de cuilleron à bord finement denticulé. Le maxillipède possède un palpe allongé terminé par de petites soies très courtes. Le bord inférieur du céphalon est découpé de part et d'autre par

83. Genus MUNIDION Hansen.

Body of female somewhat asymmetrical.

Ovarian bosses present on all the segments of the thorax; they are in the form of petiolated processes. Epimera very large, placed on the lateral margins of all the segments, where they occupy the entire lateral margin.

Abdomen with the segments distinctly defined; lateral parts of the first five segments lamellarly expanded in elongated lobes. Sixth or terminal segment small, not lamellarly expanded, in the form of a petiolated process.

The pleopoda are five pairs of double-branched well-developed appendages. The uropoda are a pair of double-branched appendages.

There are five pairs of incubatory lamellæ, not quite overlapping in the median ventral line; the first lamellæ have the distal part produced posteriorly in a small lobe. All seven pairs of legs are present.

The male has all the segments of the thorax distinct. The segments of the abdomen are fused. Uropoda absent. Pleopoda wanting. Branchial parasites.

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une paire de petites lamelles, à peu près d'égale importance, à cuticule squameuse et à extrémité mousse.

Les quatre premiers somites thoraciques sont large et en forme de bourrelets; sur leurs bords latéraux sont de fortes bosses pleurales à contours assez indistincts et à lame pleurale rudimentaire; les trois autres segments sont beaucoup plus étroits, leur lame pleurale est assez nette et les surfaces dorsales des sixième et septième somites s'érigent en pointes très accentuées sur la ligne médiane du corps. La face ventrale du thorax est complètement cachée par la cavité incubatrice, qui est très régulièrement développée: le premier des oostégites a une crête interne avec quelques larges digitations et sa partie postérieure ne présente pas de bord découpé ou échancré. Les péreiopodes sont très réduits, ce qui est en rapport avec le rôle à peu près nul qu'ils ont à jouer dans la fixation du parasite, solidement maintenu en place par toute la carapace de l'hôte. Le quatrième de ces appendices est figuré pl. IX, fig. 5; sous le bord latéral arrondi, le coxopodite montre une très solide armature chitineuse, destinée à mouvoir l'oostégite qui s'y rattache par sa nervure médiane; le basipodite est très large, aplati et presque carré; l'ischiopodite est beaucoup plus étroit; les deux articles suivants sont soudés et le propodite est peu développé; le dactylopodite a la forme d'une petite griffe courte, n'atteignant pas le bout du bord palmaire de l'article précédent.

Le pléon, dans sa partie centrale, est très court et très mince; toute son importance vient de l'extraordinaire développement de ses prolongements pleuraux et de ses appendices; les premiers forment de longues lamelles qui remontent parallèlement vers la partie antérieure du corps et dont les bords sont formés d'une quantité considérable et dense de longues digitations dont quelques-unes se divisent elles-mêmes en digitations secondaires; ces prolongements sont surtout développés sur les premiers somites du pléon; ils diminuent de longueur sur les derniers somites. Les endopodites des pléopodes présentent tout à fait la même forme que les parties pleurales, mais ils augmentent leur longueur en sens inverse, du premier au cinquième somite, où ils sont le plus long; les endopodites sont réduits à de gros tubercules à surface irrégulière, fixés à la base d'insertion des pléopodes. Le dernier somite du pléon ne porte que deux uropodes, de la même conformation que les lames pleurales et les exopodites

MUNIDION PARVUM Richardson.

Munidion parva Richardson, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 81–82.

Locality.—Straits of Fuca, on *Munida quadrispina* Benedict.

Head large, broader anteriorly than posteriorly, with wide frontal border. Eyes wanting. Anterior margin nearly straight, posterior margin narrowly rounded.

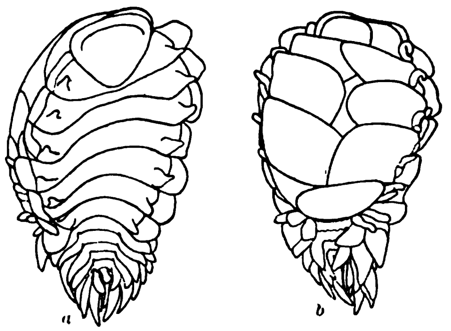

Fig. 563.—Munidion parvum. *a*, Dorsal view of female. *b*, Ventral view of same. × 8.

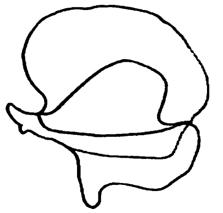

Fig. 564.—Munidion parvum. First lamella of marsupium. × 14¼.

The segments of the thorax are distinct, the first two of which are short in the median dorsal line; the other five segments are about equal in length. Ovarian bosses present on all the segments, occupying the posterior portion of the sublateral part of the segment. On

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des segments précédents, mais ils sont d'une longueur dépassant les plus longs de ces appendices; retournés et appliqués sur la surface dorsale, ils attendraient jusqu'au milieu du thorax.

Le mâle, inconnu dans les autres espèces du genre, rappelle beaucoup, par sa forme générale, celui du genre précédent (*Cancricepon*); il mesure dans sa plus grande dimension 0 mm. 55. Les antennules sont triarticulées; les antennes comptent cinq articles, dont la plupart sont garnis de poils raides; il n'y a pas de maxillipèdes. Sur la ligne médiane du thorax se trouvent des tubercules sphériques que l'on retrouve également, à la même place, sur les trois premiers somites de l'abdomen; leur surface externe est couverte de petites écailles pectinées. Les péreiopodes sont courts, robustes et terminés par une griffe aiguë. Les ouvertures génitales sont visibles de part et d'autre du tubercule ventral du septième somite thoracique, et au milieu d'une petite aire plus claire que la reste de la cuticule. Les rudiments des pléopodes se voient sur les cinq premiers somites du pléon, et les uropodes ne sont plus représentés, sur le sixième, que par deux petits bouquets de poils raides.

En général le mâle adulte est unique sur la femelle; je dois pourtant noter, comme assez fréquente, la présence de plusieurs mâles sur une même femelle; j'en ai compté jusque quatre, entre les pléopodes et les pleura et, chose curieuse, tout en ayant absolument la même forme, ils n'avaient pas la même taille; l'un d'eux était un peu plus de la moitié du plus grand et les deux autres étaient de tailles intermédiaires; les bosses ventrales se voyaient, dans les trois individus de taille moindre, sur les cinq somites de pléon, tandis que dans le plus grand, ils n'existaient véritablement que sur les trois premiers, d'ou il résulte probablement que le nombre de ces bosses diminue avec l'âge. Le même fait se présente également chez *Cancricepon elegans*.—Jules Bonnier, Travaux de la Station zoologique de Wimereux, VIII, 1900, pp. 263–266.

all the segments they are in the form of petiolated processes. The epimera are large plates which occupy the whole of the lateral margin of the segments. These plates are larger on the posterior segments than on the anterior ones.

The abdominal segments are all distinct. The first five are produced laterally in epimeral lobes, elongated and leaf-shaped, decreasing in size gradually from the first to the fifth segments. These lobes do not cover the dorsal surface of the abdomen, or obscure the small terminal segment, which is visible dorsally as a small rounded petiolated process.

The pleopoda are five pairs of double-branched elongated leaf-like appendages; the inner branches are smaller than the outer. The uropoda consist of a pair of biramous appendages, each with one large outer and one small inner branch, similar in shape to the branches of the pleopoda.

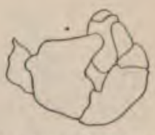
FIG. 565.—MUNIDION PARVUM. LEG OF SIXTH PAIR OF ADULT FEMALE. × 20½.

The ventral side of the abdominal segments is keeled on the posterior margin. The pleopoda and abdominal epimera are somewhat carinated on both surfaces.

The marsupium is bounded by five pairs of incubatory lamellæ, the third pair of which do not overlap in the median ventral line, so that a small opening is left into the incubatory pouch. The terminal lobe of the distal segment of the first pair is very small, but well defined.

The seven pairs of legs are all similar; the basis is furnished with an extremely high expansion, the anterior end of which is twice as high as the other end.

The male has all the segments of the thorax distinct. The segments of the abdomen are fused into a single piece. There is no indication of the coalesced segments on the lateral margins of the abdomen, these margins being entire. The posterior portion of this segment is narrower than the anterior portion, its apex, however, being widely rounded. Its length is about one and one-half times its greatest breadth. Eyes are present.

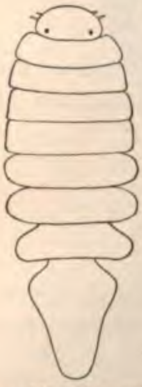
FIG. 566.—MUNIDION PARVUM. MALE. × 23.

Only one specimen comes from the Straits of Fuca, taken by the U. S. Bureau of Fisheries steamer *Albatross* at a depth of 152 fathoms. Parasitic on *Munida quadrispina.*

Type.—Cat. No. 29095, U.S.N.M.

This species is a very much smaller one than the type species of the genus described by Dr. Hansen,[a] being less than half the size of *Munidion princeps*. The present species differs from the type species in its much smaller size; in the relatively larger and differently shaped

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[a] Bull. Mus. Comp. Zool. Harvard College, XXXI, 1897, pp. 115–117.

head; in the larger thoracic epimera (pleural plates); in the differently shaped ovarian bosses; in the smaller and differently shaped abdominal epimera, which do not conceal the abdominal segments dorsally as in that species; in the differently shaped carina on the basis of all the legs; in the absence of the sinuous lateral margins of the abdomen of the male; and in the broader apex and greater length compared with the width of the abdomen of the male.

86. Genus CRYPTIONE Hansen.

Body of female somewhat asymmetrical.

Ovarian bosses present on the first four thoracic segments. Epimera well developed and distinct on the first four segments, occupying the anterior portion of the lateral margin; those of the last three segments are not distinct from the segments.

Segments of the abdomen distinct; the lateral parts of the first five segments are well developed; the sixth or terminal segment is small and has the lateral parts not developed.

The uropoda are simple, single-branched, and consist of a pair of elongated lamellæ.

The pleopoda consist of five pairs of double-branched lamellæ.

There are five pairs of incubatory lamellæ which do not completely inclose the incubatory pouch.

All seven pairs of legs are present.

The male has all seven segments of the thorax distinct.

The segments of the abdomen are also distinct. The sixth or terminal segment has the post-lateral angles produced backward on either side.

There are five pairs of simple sac-like pleopoda.

Branchial parasites.

CRYPTIONE ELONGATA Hansen.

Cryptione elongata Hansen, Bull. Mus. Comp. Zool., Harvard College, XXXI, 1897, pp. 112-115, pl. III, figs. 5-5a; pl. IV, figs. 1-1g.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 869; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 338.—Bonnier, Trav. de la Station Zool. de Wimereux, VIII, 1900, pp. 285-287.—Richardson, Proc. U. S. Nat. Mus., XXVII, 1904, p. 87.

Locality.—Near the Galapagos Islands on *Nematocarcinus agassizii* Faxon, which occurs as far north as Acapulco, Mexico.

Body of female somewhat elongated, asymmetrical. Length 19 mm.: width 11 mm.

Head a little wider than long, 4 mm.: 5½ mm., with the anterior and posterior margins widely rounded or arcuate, and the lateral margins produced in a small lobe on either side about the middle. Eyes absent. The first pair of antennæ are composed of three articles, the last of which is minute. The second pair of antennæ are composed of four articles.

The seven segments of the thorax are distinct. The first four have well-developed epimera, occupying the anterior half of the lateral margins, each epimeron being placed lateral to the ovarian bosses and produced into an anterior and a posterior lobe. The epimera of the last three segments are not distinct from the segments. The anterior portion of the last three segments is produced into a large lobe which occupies the entire lateral margin, the posterior portion of the segment being small and sublateral, i. e., it lies on the inner side of the anterior portion. The anterior lobes are larger on one side of the body than they are on the other side, and they have an additional small,

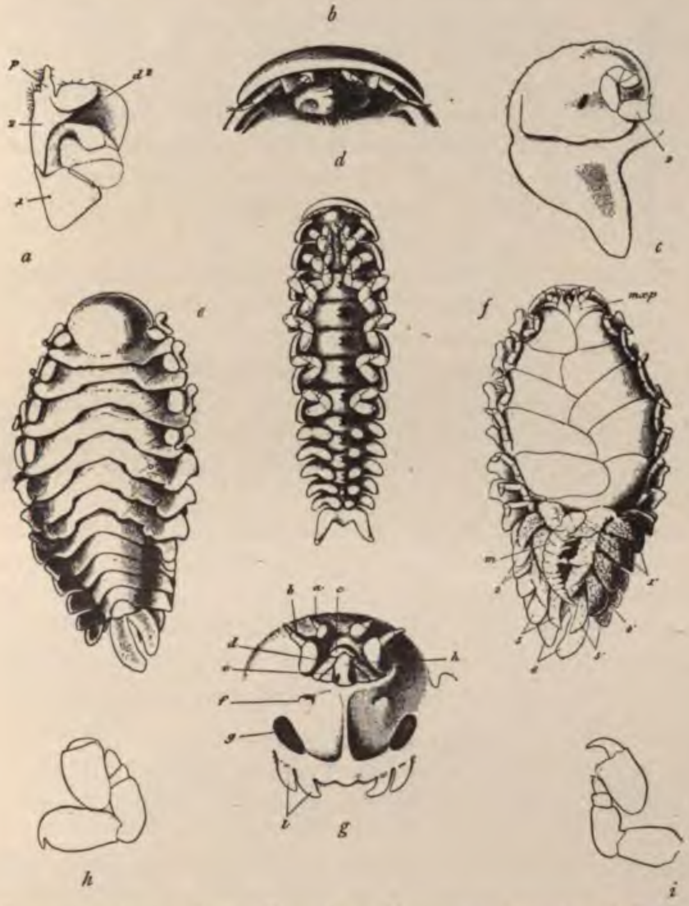

FIG. 567.—CRYPTIONE ELONGATA (AFTER HANSEN). *a*, MAXILLIPED OF FEMALE. *b*, HEAD OF MALE (VENTRAL VIEW). *c*, FIRST INCUBATORY LAMELLA OF FEMALE AND FIRST LEG. *d*, VENTRAL VIEW OF MALE. *e*, DORSAL VIEW OF FEMALE. *f*, VENTRAL VIEW OF FEMALE. *g*, HEAD OF FEMALE WITH BOTH MAXILLIPEDS OMITTED (SEEN FROM BELOW). *h*, FIRST LEG OF MALE. *i*, FIFTH LEG OF MALE.

rounded process developed at the anterior end. These processes are almost rudimentary on the other side.

All six segments of the abdomen are distinct. The lateral parts of the first five segments are well developed. The sixth or terminal segment is small, and has the lateral parts not developed. The uropoda are simple, single-branched, and consist of two elongated lamellæ. The pleopoda are five pairs of double-branched lamellæ, which are elongated and tapering, leaf-like and covered with tubercles. The ventral side of the first five abdominal segments has the posterior margin produced into numerous small elongated processes.

There are five pairs of incubatory lamellæ, which do not completely inclose the marsupial cavity.

The legs are all similar and prehensile, and have no carinæ on the basis.

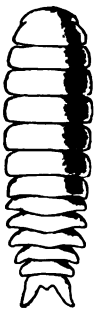

FIG. 568.—CRYPTIONE ELONGATA (AFTER HANSEN). DORSAL VIEW OF MALE.

The male is 4½ mm. long (not including the uropoda) and 1½ mm. wide. The head is without eyes and has the frontal margin widely rounded. The first pair of antennæ are composed of three articles. The second pair of antennæ are composed of eight articles, the last four being minute and rudimentary.

All seven segments of the thorax are distinct. The seven pairs of legs are prehensile.

All six segments of the abdomen are distinct. The sixth or terminal segment has the post-lateral angles produced in an elongated process on either side, which probably represent the uropoda. Between the uropoda the posterior margin of the terminal segment is triangularly produced. There are five pairs of simple sac-like pleopoda.

87. Genus PSEUDIONE Kossmann.[a]

Body of female oval, somewhat asymmetrical.

Segments of abdomen distinct. Epimera well defined, not contiguous. Lateral parts of abdominal segments lamellar, more or less projecting.

Terminal segment of abdomen small, with sides not lamellarly produced.

Incubatory plates meet in the median ventral line, concealing the incubatory pouch and the eggs; first pair with the distal segment usually produced in a lobe.

All seven pairs of legs present. Pleopoda well developed, double-branched. Uropoda simple, consisting of a pair of lanceolate lamellæ.

Male with the segments of thorax and abdomen distinct. Pleopoda present in the form of five pairs of small rudimentary sac-like bodies, a pair for each of the first five segments. The uropoda are wanting.

Branchial parasites.

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[a] See G. O. Sars for characters of genus, Crust. of Norway, II, 1899, pp. 200–201.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS PSEUDIONE.

a. Lateral parts or pleural lamellæ of abdomen of female elongated, and covering to a great extent the pleopods.
  b. Distal segment of the first lamella of the marsupium produced posteriorly in a lobe.
    c. Inner branch of the pleopoda much larger than outer branch, elongate, and pointed; surface roughened by irregularly transverse rugæ. Pleural plates of the last three segments of the thorax not developed as lamellæ. First incubatory lamellæ with the distal segment produced in a lobe which is small and strongly curved inward .... *Pseudione giardi* Calman
    c′. Inner branch of the pleopoda a little larger than the outer branch, triangular or ovate; surface smooth. Pleural plates of the last three segments of the thorax developed as lamellæ. First incubatory lamellæ with the distal segment produced in a lobe which is large and directed straight backward. *Pseudione galacanthæ* Hansen
  b′. Distal part of the first lamella of the marsupium not produced posteriorly in a lobe .... *Pseudione furcata* Richardson
a′. Lateral parts or pleural lamellæ of abdomen of female not elongated, but reduced in size and short, not covering to a great extent the pleopoda. *Pseudione curtata* Richardson

PSEUDIONE GIARDI Calman.

Pseudione giardi Calman, Ann. N. Y. Acad. Sci., XI, 1898, pp. 274–281, pl. xxxiv, fig. 5.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 869; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 337; American Naturalist, XXXIV, 1900, p. 309.—Bonnier, Trav. de la Station Zool. de Wimereux, VIII, 1900, pp. 299–300.—Richardson, Proc. U. S. Nat. Mus., XXVII, 1904, p. 78.

Locality.—Puget Sound on *Pagurus ochotensis* (Brandt).

"*Description of female.*—The single specimen, measuring 12 mm. in length, was taken from the right branchial cavity of its host (*Pagurus ochotensis* (Brandt)), and it is accordingly a dextral individual (*Bopyre droit* Giard and Bonnier), though the outline of its body seems at first sight to indicate a sinistral curvature from the concavity of the right margin in the region of the posterior thoracic segments. Closer examination, however, shows that the head and the abdominal region are turned toward the left and that the pleopods of the right side are longer than those of the left, as in a normal dextral individual, so that the peculiar curvature of the body is in all probability merely an accidental variation.

"The specimen shows no traces of pigmentation. The dorsal surface is flat or slightly concave; the ventral is convex, and is covered, except in the region of the abdomen, by the greatly developed brood-pouch. The dorsal swelling of the cephalic region which marks the position of the stomach (*cephalogaster*) is very slight. An irregularly oval, somewhat convex area, the 'ovarian bosse,' is marked off by a groove on each side of the first four thoracic segments on the dorsal surface.

"The abdominal segments, six in number, are distinctly separated from each other. The ventral surface of the abdominal segments and of the last two or three thoracic segments is roughened by longitudinal rugæ, which are most marked on the adjacent margins of the segments. These rugæ are neither so conspicuous nor so regularly disposed as in the case of the allied *Palægyge borrei*, described by Giard and Bonnier (Bull. Scient. Fr. et Belg., XIX, 1888, p. 68.) The anterior margin of the head is bordered by a narrow membranous expansion (*limbe antérieur*, G. & B.), which shows a distinct notch and several fainter undulations on each side of the middle line. No trace

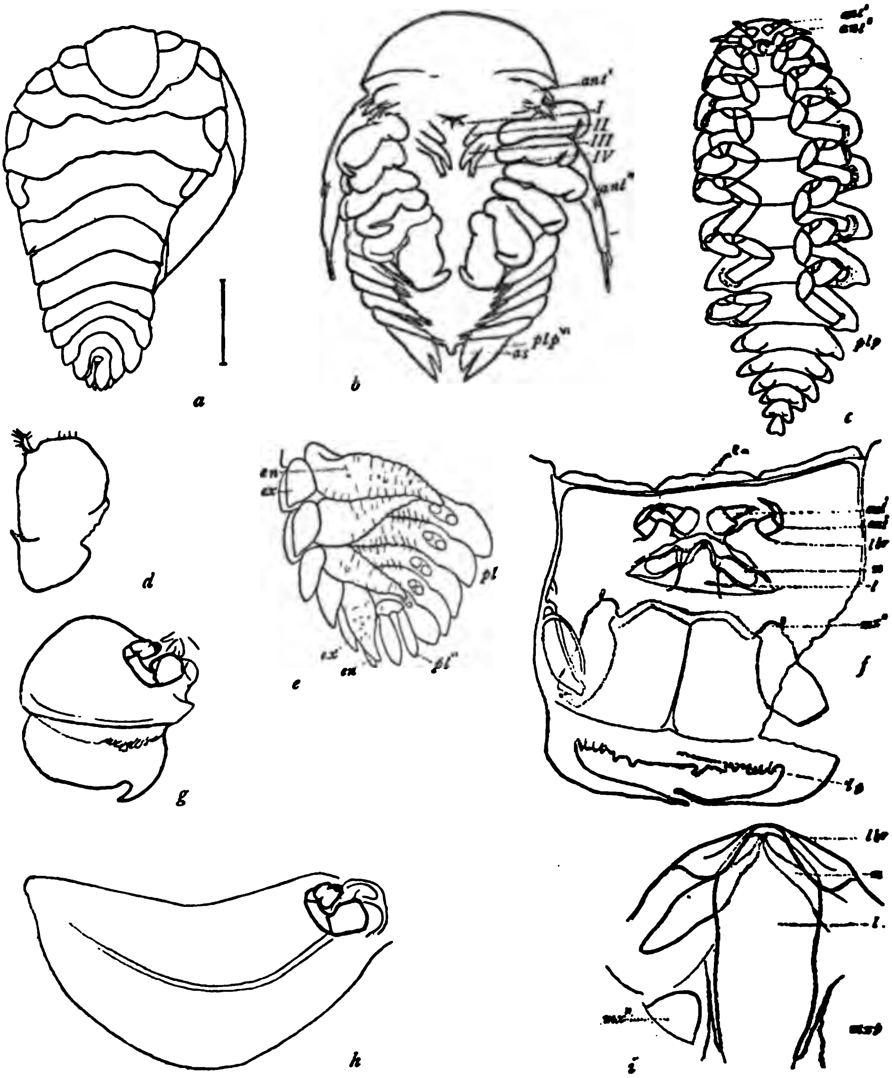

FIG. 569.—PSEUDIONE GIARDI (AFTER CALMAN). *a*, DORSAL VIEW OF FEMALE. *b*, EMBRYO. *c*, VENTRAL VIEW OF MALE. *d*, MAXILLIPED. *e*, ABDOMEN. *f*, UNDER SURFACE OF HEAD. *g*, FIRST INCUBATORY LAMELLA WITH PEREIOPOD. *h*, SECOND PEREIOPOD. *i*, MOUTH PARTS.

could be discovered on the thoracic segments of the pleural lamellæ, which in *Palægyge* are said to be 'rudimentaires et à peine visibles.'

"The antennules (inner antennæ) are short, conical, composed of three joints and bearing a few minute setæ at the tip. The antennæ (outer antennæ) are composed of five joints, of which the first is indistinctly marked off from the lower surface of the head; the third is longer and much more slender than the second, the fifth is very minute. The mandibles, which are embraced by the upper and lower lips to form the characteristic 'beak' of the *Epicaridea*, are of the usual shape. The first pair of maxillæ appear to be absent. After a careful examination we have been unable to find any distinct rudiments of them, though the triangular areas between the base of the mandibles and the lower lips on each side bear some resemblance to the rudiments of these organs in *Palægyge* (Giard and Bonnier, in the work mentioned, pl. v, f. 2). The rudiments of the second maxillæ are to be detected further back on the under surface of the head. Immediately in front of each a relatively large opening leads into a capacious tube lined by an invagination of the chitinous cuticle, the protuberance interpreted as the rudiment of the second maxilla forming the lower or posterior lip of this orifice.

"Unfortunately, these tubes were not discovered till the soft parts of the head had been removed by caustic potash, so that we are unable to say anything as to their connections inside the body. This is the more to be regretted since we know of nothing analagous to these organs, not only in the *Epicaridea* but even among the *Malacostraca*.

"The maxillipeds are similar to those of *Palægyge*, but somewhat narrower. Each consists of a flat, roughly quadrangular plate partially divided into two parts by an oblique line. The posterior part has its external angle rounded and pointed as in *Palægyge borrei*, and the antero-internal angle is produced. The anterior margin of the maxilliped bears a few setæ, and at its inner angle is articulated the small 'palp,' also setose.

"Posteriorly, the lower surface of the head terminates in a freely projecting lamina, the '*limbe postérieur*' of Giard and Bonnier. In the present species this lamina is cut up into a fringe of digitate processes, commencing on each side a little way from the middle line and increasing in size outwards. Externally, on each side the lamina is produced into a long process, narrowing gradually from its base to a rounded tip, turned inwards and extending beyond the middle line. In *Palægyge* there are two pairs of shorter processes and no fringe of minute digitations.

"The thoracic legs are all similar and of the usual structure. The 'adhesive cushions' present on the proximal segments of the first pair in *Palægyge* are here absent. The oöstegites or brood lamellæ were unfortunately injured in the single specimen found. The usual five pairs are present and are much larger than in *Palægyge borrei*, all the pairs except, perhaps, the third and fourth, overlapping across the median line. The first pair are, as usual, of somewhat complex form. Roughly quadrilateral in shape, the posterior corner is produced into a hook-like process directed inward. A little behind the middle of its length the lamella is crossed by a transverse fold, forming on its outer or lower surface a deep groove, the anterior margin of which is produced as an overlapping ridge. On the inner, or, in its natural position, upper, face of the lamella the fold projects as a strong ridge which for part of its length is fringed with digitate processes. The front edge of the second pair of oöstegites is received into the groove on the lower surface of the first pair. The last two pairs are strongly fringed with setæ on the posterior edge.

"Five pairs of biramous pleopods are present, successively diminishing in size posteriorly, those of the right side being, as already mentioned, considerably larger than those of the left. In the first pair the exopodite (lobe *b*, according to the nomenclature of Giard and Bonnier) is roughly quadrilateral in shape and much smaller than the endopodite (lobe *c*), which is long and pointed. In the posterior pairs the exopodite approaches more closely in size and shape to the endopodite. The last segment of the abdomen is very small, and bears articulated to its posterior margin a pair of lanceolate lamellæ, of which the right is broader and slightly longer than the left. These lamellæ may possibly represent the sixth pair of pleopods, but a comparison with Giard and Bonnier's figure of the corresponding region in *Palægyge borrei* suggests that we have here to do with the rudimentary pleural lamellæ (lobe *a* of Giard and Bonnier), which, separated by a distinct suture from the fifth and sixth segments in the last-named species, are here only distinct on the sixth segment. If this view be adopted the sixth pair of pleopods are entirely absent.[a] In all the pleopods the surface of the endopodite is roughened by irregularly transverse rugæ, which are most distinct on the anterior pairs.

"*Male.*—A male individual about 3 mm. long was found under the pleopods of the female. The body is symmetrical, lanceolate in outline, the fourth thoracic segment being the widest. A pair of eyes are present near the posterior corners of the head. Both antennules and antennæ are well developed, the former having three, the latter five segments. As in the female, no distinct rudiments of the first maxillæ could be identified. The second maxillæ have the form of rather large, rounded tubercles. The maxillipeds are present as long, slender processes, each tipped by a single seta, inserted on each side close to the base of the lower lip. The seven pairs of thoracic feet are all similar and of the usual form, with powerful subchelate terminations.

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[a] These lamellæ, attached to the sixth abdominal segment, are the uropoda.—H. R.

"The six abdominal segments are distinct, regularly diminishing in size posteriorly, and the first five show rudiments of pleopods in the form of slight rounded eminences on the ventral surface. In *Palægyge borrei*, Giard and Bonnier describe the male as having rudiments of pleopods on the first three abdominal segments only (p. 70), but in a later paper the same authors speak of the abdominal segments of the male in the genus *Palægyge* as being *all* furnished with these rudiments. (Bull. Scient., XXII, 1890, p. 373.) The last segment of the abdomen is very small, cordate in form, being very narrow anteriorly, and having its hinder margin notched; its greatest breadth is about equal to the length."—CALMAN.[a]

A description of the first larval stage of this form follows; as it is characteristic of this stage in other *Epicaridea* it is not necessary to quote the description.

PSEUDIONE GALACANTHÆ Hansen.

Pseudione galacanthæ HANSEN, Bull. Mus. Comp. Zool. Harvard College, XXXI, 1897, pp. 118–120, pl. v, fig. 22 *i*.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 869; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 338.—BONNIER, Trav. de la Station Zool. de Wimereux, VIII, 1900, pp. 304–306.—RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 78.

Localities.—Gulf of California, in the branchial cavity of *Galacantha diomediæ* var. *parvispina* Faxon; near Flattery Rocks, Washington, on *Munnida quadrispina* Benedict.

Body of female somewhat asymmetrical. Length 11 mm. Width 8 mm.

Head as wide as long, 3 mm. : 3 mm., with the anterior margin straight. The posterior margin is rounded. Eyes absent. The first pair of antennæ are composed of three articles. The second pair are composed of five articles.

All the seven thoracic segments are distinct. The lateral parts of the first four segments are divided into a large anterior lobe and a small posterior lobe. Ovarian bosses are present on the first four segments, situated on the anterior portion of the lateral parts of these segments. The epimera are not distinctly separated on any of the segments, but occupy the small posterior lobe of the lateral margin of the first four segments and the entire lateral margin of the last three segments. All six segments of the abdomen are present. The first five have the lateral parts well developed and produced in elongated lamellæ, which almost entirely conceal the underlying pleopoda. The sixth or terminal segment is small, and has the lateral parts undeveloped. The uropoda are simple, single-branched, elongated lamellæ, attached to the sixth abdominal segment. The pleopoda are five pairs of double-branched elongated lamellæ attached to the first five

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[a] Ann. N. Y. Acad. Sci., XI, 1898, pp. 274–281.

abdominal segments on the underside. The posterior margins of the abdominal segments and the anterior as well as the posterior margins of the last two thoracic segments are, on the ventral side, produced in small round lamellæ or knots. There are five pairs of incubatory lamellæ, the first pair of which have the distal portion produced on the posterior margin in a small lobe.

All the seven pairs of legs are prehensile, and have a low rounded carina on the basis.

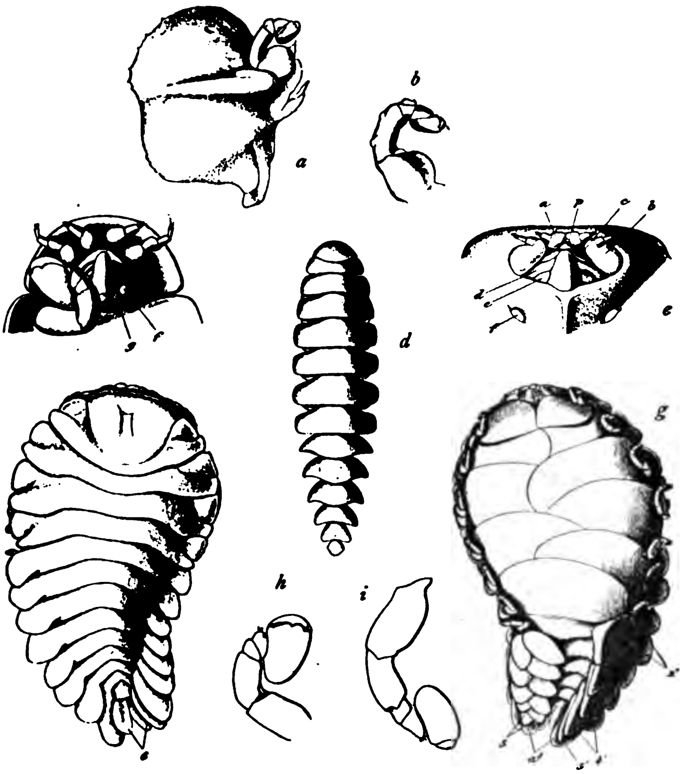

Fig. 570.—Pseudione galacanthæ (After Hansen). *a*, First leg with incubatory lamella. *b*, Sixth leg of female. *c*, Head of smaller male. *d*, Dorsal view of male. *e*, Head of female (ventral view). *f*, Dorsal view of female. *g*, Ventral view of female. *h*, First leg of male. *i*, Seventh leg of male.

The male is narrow, elongate, 4.8 mm. long and about 1.2–1.4 mm. wide. Eyes small, distinct. Anterior margin of head rounded. The first pair of antennæ are composed of "three" articles. The second pair of antennæ are composed of "five" articles. All seven segments of the thorax are distinct. The seven pairs of legs are prehensile. The six segments of the abdomen are distinct. The sixth or terminal segment is small, with the posterior margin truncate. There are no uropoda. The pleopoda are five pairs of small, simple, sac-like bodies, almost rudimentary, a pair attached to each of the first five abdominal segments.

PSEUDIONE FURCATA Richardson.

Pseudione furcata RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 79.

Locality.—Eastern shore of Virginia.

Body of female longer than broad, more or less ovate.

Head with frontal border; anterior margin nearly straight; posterior portion narrowly rounded. Head small and deeply immersed in thorax.

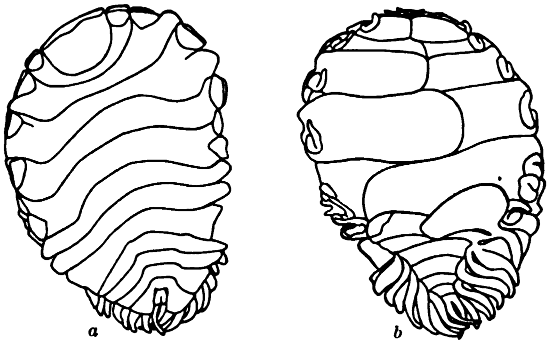

FIG. 571.—PSEUDIONE FURCATA. *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF SAME. × 4.

Mouth parts and antennæ concealed by first lamellæ of marsupium. The first antennæ are composed of three, the second of four joints.

The thorax has all the segments distinct. Ovarian bosses are large and prominent on the first four segments. The epimera on these segments are represented by narrow ridges lateral to the ovarian bosses; those of the three last segments occupy all of the lateral margin.

The segments of the abdomen are all distinct with the epimera produced in wide plates on either side of the narrow middle portion of the segment. The sixth or terminal segment is without epimera, and terminates posteriorly in two small, rounded lobes. The pleopoda are five pairs of smooth, narrow, elongated, biramous appendages, all similar and equal in size, with the exception of the inner branch of the first pair, which is exceedingly large and is inwardly directed, meeting the corresponding branch of the opposite side in the median ventral line, just below the incubatory pouch. All the remaining branches are directed post-laterally. The surfaces of all the lamellæ are quite smooth. The uropoda consist of a single pair of simple appendages, similar in shape and size to the pleopoda.

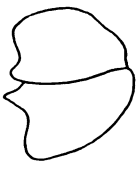

FIG. 572.—PSEUDIONE FURCATA. FIRST LAMELLA OF MARSUPIUM.

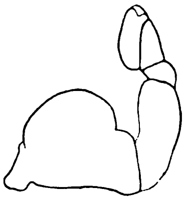

FIG. 573.—PSEUDIONE FURCATA. LEG OF SIXTH PAIR OF ADULT FEMALE. × 20½.

The incubatory pouch consists of five pairs of large lamellæ, overlapping in the median line. The terminal lobe of the first pair of plates is not defined.

There is a high and widely rounded expansion or carina on the basis of all the legs.

Male unknown.

Four specimens were collected on the eastern shore of Virginia by Prof. H. E. Webster. Host unknown. They were sent from Union University to the U. S. National Museum.

Type.—Cat. No. 29093, U.S.N.M.

PSEUDIONE CURTATA Richardson.

Pseudione curtata RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 80–81.

Locality.—Key West, on *Petrolisthes sexspinosus* (Gibbes).

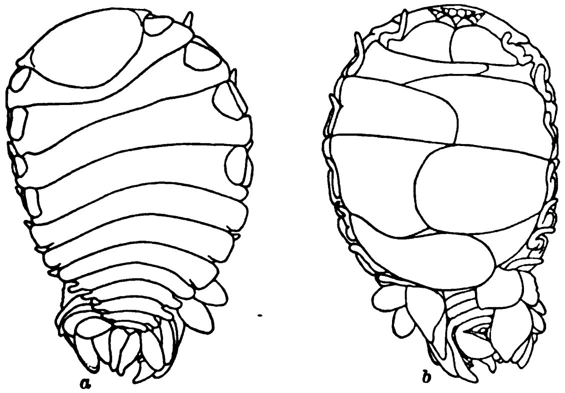

FIG. 574.—PSEUDIONE CURTATA. *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF SAME. × 8.

Head very large, with wide anterior margin, almost straight; no frontal border. Antero-lateral portion produced in a small process on either side. Posterior portion widely rounded. Eyes wanting.

The segments of the thorax are distinct. The epimera are distinct as narrow plates on the extreme lateral margin of the anterior portion of the first four segments. Ovarian bosses are prominent on the anterior portion of the first four segments. The epimera occupy almost all of the lateral margin of the three posterior segments.

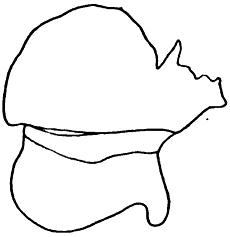

FIG. 575.—PSEUDIONE CURTATA. FIRST LAMELLA OF MARSUPIUM. × 14½.

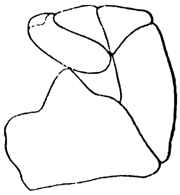

FIG. 576.—PSEUDIONE CURTATA. LEG OF SIXTH PAIR OF ADULT FEMALE. × 39.

The abdomen has the six segments distinct. All are produced laterally in small rounded epimera with the exception of the last, or terminal segment which is very small and rounded posteriorly.

The pleopoda are five pairs of large, broad, smooth, leaf-like, double-branched appendages not concealed on the dorsal side by the small epimeral plates of the abdominal segments, from which they project in full view. The uropoda are a pair of single-branched, simple appendages, similar in shape to the branches of the pleopoda.

The marsupium is formed of five pairs of incubatory lamellæ, which overlap so as to completely encompass the ventral surface of the body; the first pair have the terminal lobe of the distal segment small, but well defined.

There are seven pairs of small legs, all similar in size and structure; a high triangularly shaped expansion or carina is present on the basis.

Color uniformly light yellow.

Male, two and one-third times longer than broad, with all seven segments of the thorax and all six segments of the abdomen distinct. Eyes present. Abdomen occupies one-fourth of the entire length of the body.

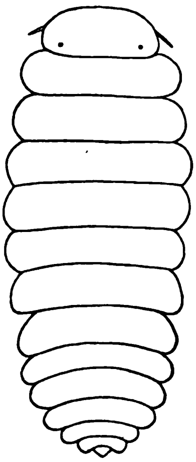
FIG. 577.—PSEUDIONE CURTATA. MALE. × 23.

Only one specimen was found at Key West by Henry Hemphill. Parasitic on *Petrolisthes sexspinosus* (Gibbes).

Type.—Cat. No. 29094, U.S.N.M.

88. Genus STEGOPHRYXUS Thompson.[a]

Branchial parasites.

Female with the sixth segment of the thorax greatly longer than any of the other segments.

Abdomen with all six segments distinct; lateral parts or pleural lamellæ not developed.

There are five pairs of tri-ramous pleopods.

Uropoda consist of a pair of small, rounded, oval bodies, between which is a small conical process.

Male with all the segments of the thorax distinct.

Abdomen ovoid, without appendages or traces of segmentation.

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[a] See Thompson for characters of genus, Bull. U. S. Fish Comm., XXI, 1902, p. 56.

STEGOPHRYXUS HYPTIUS Thompson.

Stegophryxus hyptius THOMPSON, Bull. U. S. Fish Comm., XXI, 1902, pp. 53–56, pls. IX, X.—RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 59.

Localities.—Great Harbor, Woods Hole; Hadley Harbor, Naushon; Edgartown and Warwick, Rhode Island, on *Pagurus longicarpus*.

Description of adult female.—" Broad in proportion to length, marsupium very large; abdomen about half the length of thorax, distinct from it, six-jointed, with five pairs of triramous pleopoda and a pair of oval uropoda. Length about 9.1 mm. Color yellowish-white, opaque. Ovaries, when full of ripe eggs, orange-yellow.

" Head, from the dorsal side appears as an oblong elevation, ending anteriorly in a blunt lobe, which represents the median portion of the much-reduced front. As the lateral portions of the front are almost wholly obsolete, appearing only as two inconspicuous lobes, the greater part of the antennules, antennæ, and tip of rostrum is visible dorsally. The antennules are three-jointed and consist of a large globose basal joint, surmounted by a small cylindrical second and a minute third joint; outer joints bristle-tipped. Each antenna arises along the side of rostrum as a columnar ridge whose distal end is visible dorsally. From this ridge a four-jointed flagellum arises, its proximal joint stout, the three distal joints slender; all the joints bristle-tipped. Ventral surface of head broader than dorsal surface and sharply elevated at posterior border, giving a strong antero-dorsal slope, so that the erect hypopharynx points almost anteriorly. At sides of posterior border three curved processes arise, and in the midline are two thin foliaceous plates. Rostrum conical. Mandibles slender, with expanded tips, the edges of which are incurved so that pressed together they form a sucking tube. Near the bases of mandibles appear the oval maxillulæ. Hypopharynx erect, highly keeled, and plays no part in formation of rostrum. Maxillipeds large; each consists of a foliaceous anterior and a somewhat thicker posterior blade; during life these organs keep up a rapid fanning motion. There is no trace of a palpus.

"The thorax is concealed ventrally by an enormous marsupium, built up of five pairs of thin brood-plates, each strengthened by a median chitinous rod. The posterior or fifth pair lie externally to the others and form the major part of marsupium; they are attached along the border of fifth and sixth thoracic segments. The posterior angle of each forms a shallow pouch. Nearly concealed by these plates, and almost closing the marsupium anteriorly, are the third and fourth pairs of plates, similar to each other in shape and having an oral ventral and a rounded dorsal portion. This dorsal part conceals the legs of the parasite. The second pair of plates are oblong and are hidden under the others. The first pair consists of a rather oval anterior and a triangular posterior blade. The latter is strengthened along its outer (longest) border and across its base by a chitinous rod. The anterior blades, in company with the dorsal portions of the third pair of plates, form the funnel-like anterior end of the marsupium.

"The details of the thoracic segments are shown in fig. 578*c*. The first five are crowded together, their fleshy lateral portions strongly bent toward the head. The lateral parts of first four segments end in a small roughened boss or cushion, on which the roughened third joint of the pereiopod impinges. This cushion may represent a modified epimeron. Internally to this cushion is a flat shield-shaped area which comes in contact with the abdomen of the host. The

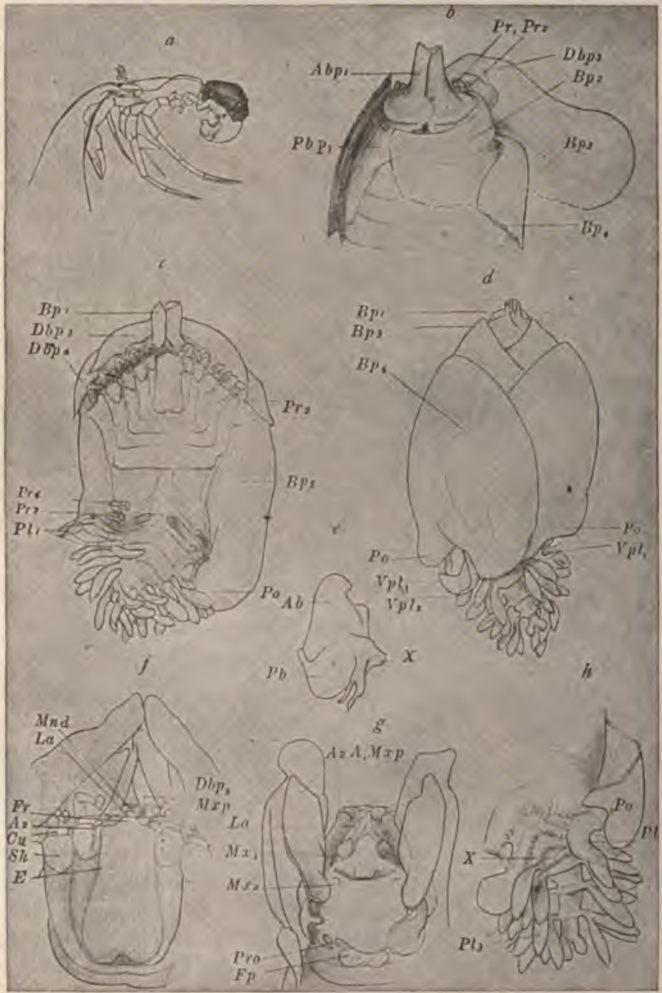

FIG. 578.—STEGOPHRYXUS HYPTIUS (AFTER THOMPSON). *a*, HERMIT CRAB WITH PARASITE ATTACHED. × ⅘. *b*, ANTERIOR PORTION OF HEAD OF FEMALE (VENTRAL SIDE). *c*, DORSAL VIEW OF ADULT FEMALE. × 5¼. *d*, VENTRAL VIEW OF SAME. × 4⅔. *e*, LEFT MAXILLIPED OF ADULT FEMALE. × 10. *f*, HEAD OF ADULT FEMALE (DORSAL VIEW). × 11¼. *g*, HEAD OF ADULT FEMALE (VENTRAL SIDE). *h*, ABDOMEN AND POSTERIOR PART OF THORAX OF ADULT FEMALE (VENTRAL VIEW). × 5¼.

lateral portions of fifth segment end in a sharp crest, and there is no 'shield.' The sixth segment is very long; it narrows posteriorly, has a fleshy median keel and only slightly developed lateral portions. The seventh segment is short. fleshy, about as wide as sixth and similar to it, except that it is not keeled. Ventral surface of thoracic segment fleshy, posterior borders of sixth and seventh modified into complex elevated keels. Pereiopoda of the sixth and seventh segments are alike and quite simple in construction; those of the other

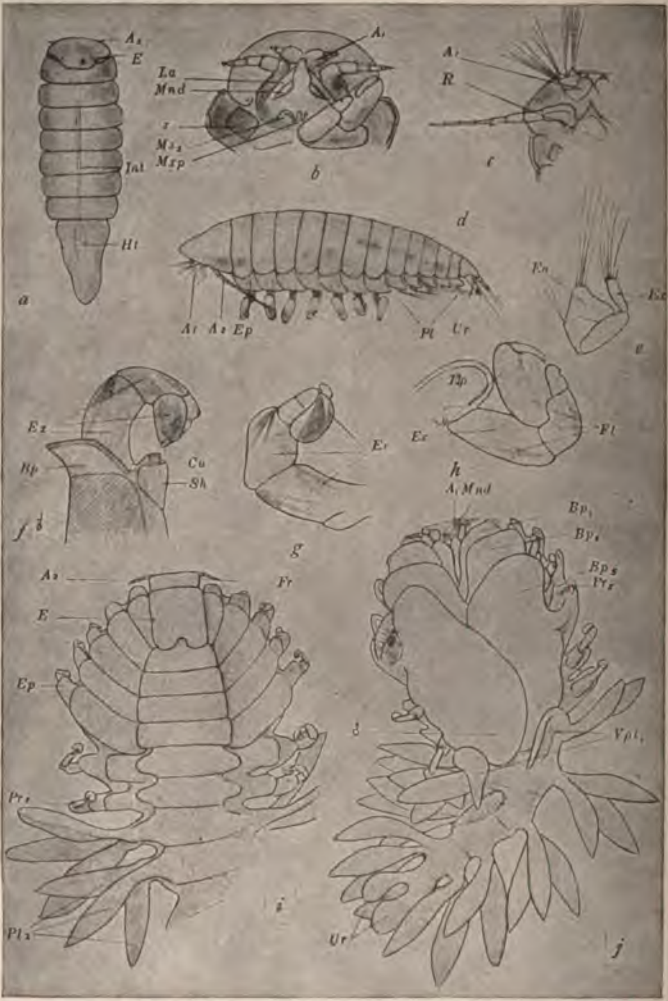

FIG. 579.—STEGOPHRYXUS HYPTIUS (AFTER THOMPSON). *a*, DORSAL VIEW OF ADULT MALE. × 12. *b*, VENTRAL SIDE OF HEAD OF SAME. × 22. *c*, VENTRAL VIEW OF HEAD OF CRYPTONISCID. × 110. *d*, CRYPTONISCID FROM YOUNG FEMALE (LATERAL VIEW). × 58. *e*, PLEOPOD OF THIRD ABDOMINAL SEGMENT OF CRYPTONISCID. × 70. *f*, MUSCULATURE OF ONE OF FIRST FOUR PEREIOPODA (ADULT FEMALE). × 20. *g*, MUSCULATURE OF ONE OF SIXTH OR SEVENTH PEREIOPODA OF FEMALE. × 20. *h*, MUSCULATURE OF PEREIOPOD. × 40. *i*, DORSAL VIEW OF LARVAL FEMALE. × 12. *j*, VENTRAL VIEW OF SAME. × 6¾.

five segments are modified, the last three joints being twisted to one side. Extensor muscles enormously developed.

"The abdomen consists of six fleshy segments, five of which bear a pair of pleopoda. Each pleopod has three oval blades arising from a short common base. Two of these are subequal and extend in a lateral direction; the third is smaller and points ventrally. This ventral ramus is broadly expanded in the pleopoda of the first abdominal segment, especially on the right side. The first segment has ventral keels similar to those on the last thoracic segments. Between the oval uropoda of the sixth segment is a minute conical prominence."

Description of adult male.—"Three and two-thirds longer than broad. Abdomen unsegmented, about a third of entire length. Color dull yellowish. Around the heart in the abdomen is an orange-colored area, and a narrow streak of same color runs forward along the mid-dorsal line. Sometimes splashes of black occur on the sides of the head and thorax. Length about 3 mm.

"Head oval, elevated in center, the margin entire and not inflexed. Eyes minute. On the under side is a shallow central depression, in front of which arise the three-jointed antennulæ. From the depression the eight-jointed antennæ and the conical rostrum take their origin. First joint of antennæ elbowed, the others cylindrical, the distal ones bristle-tipped. Sixth, seventh, and eighth joints very small, together scarcely equalling the fifth in length. Rostrum prominent, built up dorsally by the labrum and ventrally by the hypopharynx. Apex of latter conceals tips of mandibles and median part of labrum. Mandibles slender, with thick bases and sharp chitinous tips. I have not found maxillulæ. Between the maxillæ and extending forward from a transverse ridge are the three-jointed maxillipeds. The thorax consists of seven fleshy segments. It narrows slightly posteriorly and is moderately convex. Sides subparallel, somewhat deflexed, epimera not distinct. First segment notched for reception of head. Seven pairs of pereiopoda, whose structure and musculature can be understood by reference to the plate. Abdomen ovoid or sometimes pear-shaped, shows no sign of segmentation, and has no traces of appendages."—M. T. THOMPSON.[a]

89. Genus STEGIAS Richardson.

Body of female with sixth segment of thorax not greatly longer than any of the others.

All six segments of abdomen distinct; lateral parts or pleural lamellæ not developed. First three pairs of pleopods triramous; last two pairs biramous. Uropoda consist of a pair of elongated lamellæ, without a conical process between the two.

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[a] Bull. U. S. Fish Commission, XXI, 1902, pp. 53–56. Consult this reference also for description of immature forms.

STEGIAS CLIBANARII Richardson.

Stegias clibanarii RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 59–60.

Locality.—Bermudas, on *Clibanarius tricolor.*

Head deeply set in thorax, broader posteriorly than anteriorly, longer than broad, and with straight frontal margin. First pair of antennæ visible on dorsal surface, just anterior to front, as two small lobes, each antenna terminating in a minute joint. Second pair of antennæ also visible on dorsal surface, lying on either side of first pair of antennæ, each antenna terminating in a flagellum composed of several minute joints.

Thorax divided into seven distinct segments. The first three surround the head, and are closely crowded together. The other four are very much longer and are of nearly equal length, the fifth being much longer at the sides than the others. The first five segments at the sides are directed forward, the five pairs of legs all extending in an anterior direction. A considerable space separates the fifth pair of legs from the sixth pair. The sixth pair of legs, as well as the seventh pair, are placed at the posterior extremity of the sixth and seventh segments, respectively. The epimera of the first four segments are distinct as narrow ridges on the lateral margins of each segment. The ovarian bosses are also present on these segments.

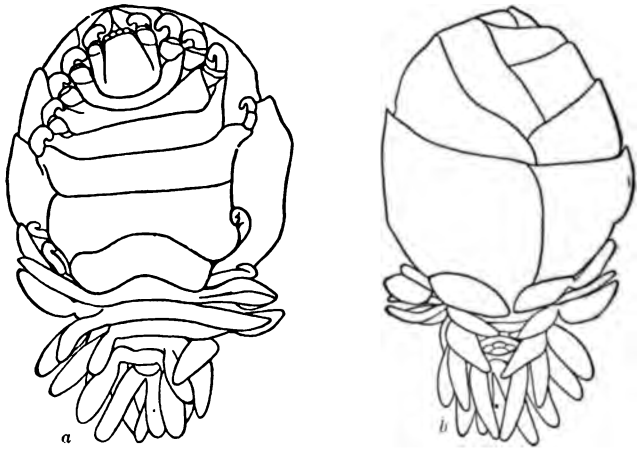

FIG. 580.—STEGIAS CLIBANARII. *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF FEMALE. × 8.

The abdomen is composed of six distinct segments, the first three of which are provided with a pair of triramous pleopods—two dorsal branches and one ventral branch to each pleopod; the next two segments, the fourth and fifth, are each provided with a pair of biramous pleopods, both branches of each pleopod being dorsal, the ventral branch, corresponding to that of the first three segments, not being represented; the sixth segment of the abdomen is furnished with a pair of simple elongated uropoda, equaling in length the dorsal branches of the pleopoda of the other abdominal segments.

The marsupium is composed of five pairs of lamellæ, the lamellæ of the fifth pair being very large, and occupying almost half of the ventral side of the thorax.

Male unknown.

Only one specimen was collected by Dr. G. Brown Goode at the Bermudas in 1876-77. The parasite was found attached to *Clibanarius tricolor*.

Type in the Peabody Museum, Yale University.

This genus differs chiefly from *Stegophryxus* Thompson, to which it is closely related in having the pleopoda of the fourth and fifth abdominal segments biramous instead of triramous; in having the uropoda long and leaf-like, similar in shape and size to the branches of the pleopoda, while in *Stegophryxus hyptius*, the type species of the genus, the uropoda are small, rounded, and knob-like, with a minute conical prominence between them; and in not having the sixth thoracic segment greatly longer than the others.

90. Genus BATHYGYGE Hansen.

Body of female asymmetrical, the abdomen being turned to one side in a marked degree. Epimeral plates, consisting of large oval lamellæ, anteriorly very much produced and attached near the inner posterior margin.

Segments of the abdomen distinct; lateral parts or pleural lamellæ not developed. Abdomen small.

The pleopoda consist of five pairs of double-branched lamellæ, the two branches being unequal in size, and arising from a common peduncle attached to the lateral margin of the segment.

The uropoda are double-branched.

Male with the abdominal segments fused; abdomen ovate in outline. Pleopoda and uropoda absent. Segments of thorax distinct.

Branchial parasites.

BATHYGYGE GRANDIS Hansen.

Bathygyge grandis Hansen, Bull. Mus. Comp. Zool. Harvard College, XXXI, 1897, pp. 122-124, pl. vi, figs. 2-2e.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 869; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 338.—Bonnier, Travaux de la Station Zool. de Wimereux, VIII, 1900, pp. 291-292.

Locality.—Off Acapulco, in the branchial cavity of *Glyphocrangon spinulosa* Faxon.

"Only a male, and the posterior part of a female have been sent to me.

"(*a*) *Female.*—The rudiment consists of the posterior part of the thorax, bearing three legs on one and two on the other side, and the abdomen.

"Thorax: The pleural plates are very large oval lamellæ, only connected with the segment by somewhat less than the posterior half of their interior margin, and this result is due to the fact that they anteriorly are very much produced, highly overlapping each other, and posteriorly rather shortly produced. The legs are tolerably slender; the second joint not expanded; the fifth joint elongate, in the last pair as long as the hand.

"Abdomen: It is turned to the left in a startling degree and is proportionally small—perhaps very small. The dorsal surface is soft-skinned, the segments more or less distinctly separated. Pleural plates are not developed. The pleopods quite soft, of medium size, decreasing conspicuously in size from before backward and attached to the lateral margin; each pleopod consists of a short peduncle and two lamellar oblong rami; the outer ramus much larger than the inner one. The uropods biramous; the outer ramus a little smaller than the outer of the fifth pleopod, the inner ramus very short, almost rudimentary. The pleopods are curled to such a degree that it would have been impossible without much construction to draw a sketch of the abdomen.

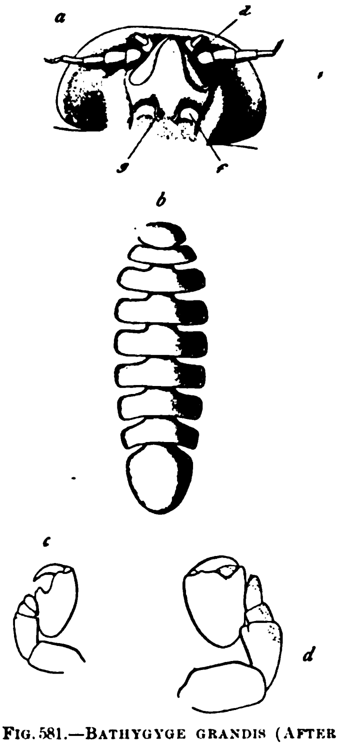

FIG. 581.—BATHYGYGE GRANDIS (AFTER HANSEN). *a*, HEAD OF MALE (VENTRAL VIEW). *b*, DORSAL VIEW OF MALE. *c*, FIRST LEG OF MALE. *d*, FIFTH LEG OF MALE.

"(*b*) *Male.*—The body is a little more than three times longer than broad, and from the fourth thoracic segment it decreases in breadth towards both ends. (Fig. 581*b*.)

"Head: The dorsal surface rather convex; the median portion of the anterior margin almost straight. No eyes. The frontal border bent slightly downward. (Fig. 581*a*.) The antennulæ rather short, three-jointed; the basal joint tolerably thick and partly overlapped by the rostrum; the second joint slender and rather short; the third very small. The antennæ comparatively long, seven-jointed; the four proximal joints of about the same length, but decreasing much in breadth from the rather thick basal joint to the fourth one; the fifth joint is short and very slender, the last two joints exceedingly small. The mouth forms a rostrum, which, when seen from below, is triangular, considerably depressed, and directed forward, reaching almost to the frontal margin of the head. The hypopharynx is very large, and just outside it is seen the very oblong lateral part of the labrum (*d*), the median part of which is concealed by the hypopharynx. At first I believed that these oblong organs were the mandibles, but a closer examination gave the result mentioned, while the mandibles, being needles with brown apex, were discovered within the rostrum. Maxillulæ are not observed; the maxillæ (*f*) are small semicircular lobes lying considerably behind the posterior edge of the labrum. The maxillipeds (*g*) are short, extremely slender, almost styliform.

"Thorax: The segments are rather convex, the incisions between them comparatively broad and very deep; the lateral margins are much curved when seen from the side. The legs increase considerably in length and very much in thickness from the first (fig. 581*c*) to the fifth pair (fig. 581*d*), which is robust, with the hand very large; the two poterior pairs again decrease somewhat in size. The terminal margin of the hand is deeply concave, thus differing considerably from the preceding forms.

"Abdomen: It occupies scarcely one-fourth of the length of the animal; it is narrower than the last thoracic segment, shortly ovate in outline, without the slightest rudiment of segmentation or abdominal feet; both the ventral and especially the dorsal surface are very convex.

"Size: Uncommonly large, being 7 mm. long and 2.3 mm. broad."—HANSEN.[a]

91. Genus PHYLLODURUS Stimpson.

"Feminæ pedes thoracis sat validi, toti ancorales, unguiculati; appendicibus branchialibus carentes. Appendices abdominis branchiales; superiores laterales, laminis duabus æquis magnis elongatis; inferiores papilliformes. Abdominis segmentus primus setis dorsalibus unguiculatis instructus."—STIMPSON.[b]

Abdominal parasites.

Body of female is almost symmetrical.

Ovarian bosses present. Posterior portion of lateral margins of thoracic segments not produced. Epimera present on all the segments, not distinctly separated on the last two; they occupy the anterior part of the lateral margin on the first four segments; on the fifth segment they are placed between the anterior and posterior divisions of the segment; on the last two segments they occupy the posterior portion of the lateral margin.

The abdomen is distinctly segmented, becoming gradually and rapdly narrower from the first to the terminal segment; lateral parts of segments or pleural lamellæ not developed. On the dorsal surface of

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[a] Bull. Mus. Comp. Zool. Harvard College, XXXI, 1897, pp. 122-124.

[b] Bost. Journ. Nat. Hist., VI, 1857, pp. 511-513.

the first segment of the abdomen close to the anterior margin, are two large papillose processes, one on either side of the median line.

There are five pairs of double-branched pleopoda, the branches in the adult being similar and subequal, and both branches being in the form of long, narrow lamellæ, issuing from a common peduncle attached to the lateral margins of the segments and forming a border surrounding the abdomen.

The uropoda are simple, in the form of two long, narrow, cylindrical lamellæ attached to the sixth abdominal segment. All seven pairs of legs are present.

The abdomen of the male is distinctly segmented. The first abdominal segment has two large rounded papillæ close to the anterior margin, one on either side of the median line. The sixth or terminal segment is posteriorly produced at the apex in a long pointed process. There are five pairs of single-branched pleopoda, in the form of long, narrow sacs, attached one on each side close to the lateral margins of the segments. The uropoda are a pair of small, simple processes, attached one on either side of the terminal segment of the abdomen.

All seven segments of the thorax are distinct.

PHYLLODURUS ABDOMINALIS Stimpson.

Phyllodurus abdominalis STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, pp. 511-513.—LOCKINGTON, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 57; Ann. Mag. Nat. Hist. (5), II, 1878, pp. 299-300.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 868; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 337.—BONNIER, Trav. de la Station Zool. de Wimereux, VIII, 1900, p. 250.—RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 78.

Localities.—Puget Sound on *Upogebiæ;* Tomales Bay on *Upogebia pugettensis* (Lockington); San Francisco Bay.

Description of female.—Body ovate, a little longer than wide, about one and a half times longer than wide, 10 mm.: 14 mm.

Head a little wider than long, 3 mm.: 4½ mm., bilobate, with the frontal margin produced in a rounded border. Eyes absent. The first pair of antennæ are small, usually inconspicuous from a dorsal view, composed of three articles, the terminal article being minute, the first article large and dilated. The second pair of antennæ are partly visible from a dorsal view. They are composed of five articles, the terminal article being minute.

The seven segments of the thorax are distinct. The anterior portion of the lateral margins of the segments is occupied by the ovarian bosses. Lateral to the ovarian bosses on the first four segments are the narrow epimeral plates. The posterior lobe of the lateral margin is small on the first segment, becoming larger on the three following segments. On the fifth segment the epimeral plate lies between the ovarian boss and the posterior lobe, being lateral partly to both. On the last two segments the epimera occupy the post-lateral margin and are not separated from the segment.

The abdomen is composed of six distinct segments. The first segment is provided on either side near the antero-lateral margin with a papillose process. This segment is nearly twice as long as any of the following segments. The segments of the abdomen are successively narrower, gradually and rapidly tapering to the sixth or terminal segment which is produced posteriorly in a long, narrow, tapering process.

On either side of the lateral margins of the first five abdominal segments are attached two long, narrow processes, arising from a common stem or peduncle. These are probably the pleopoda, which may be considered as double-branched. There are thus ten of these on either side, or twenty in all—i. e., five pairs of double-branched pleopoda. On either side of the sixth or terminal segment the uropoda are attached. They are single-branched, each consisting of one long, narrow cylindrical process. The ventral side of the last two thoracic segments is produced on the posterior margins in keels. The ventral side of the abdominal segments is slightly keeled.

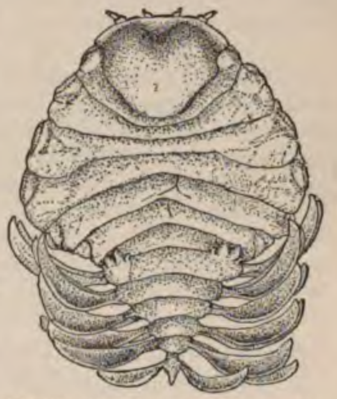

FIG. 582.—PHYLLODURUS ABDOMINALIS. FEMALE (DORSAL VIEW).

There are five pairs of incubatory plates. The distal part of the first lamellæ is posteriorly produced in a triangularly rounded lobe.

The seven pairs of legs are prehensile in character; the basis is not produced in a carina.

The young female has one of the branches (the inner one) of the pleopoda very much shorter than the other branch. The head is not bilobed, and has the front more circular in outline. I have examined three adult females, two young females, and two males. The two young females had rudiments of the incubatory lamellæ, the plates being larger in one specimen than in the other, and the inner branch of the pleopoda also larger. One specimen is a little older than the other.

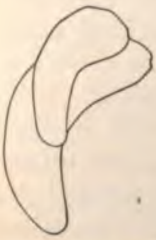

FIG. 583.—PHYLLODURUS ABDOMINALIS. ONE OF BIRAMOUS PLEOPODS OF ADULT FEMALE. × 7.

Most of the specimens were kindly sent to me by Doctor Calman. They were sent to him from Columbia University, New York. Another specimen, a female, was sent to me later by Dr. William E. Ritter, of the University of California.

Description of male.—Body oblong-ovate, a little more than twice as long as wide, 2½ mm. : 6 mm.

Head about twice as wide as long, with the anterior margin circular in outline, the posterior margin straight. The eyes are small, distinct, and situated on the posterior margin, at some distance from the sides of the head. The first pair of antennæ are short and are composed of only three articles. The second pair are composed of five articles, the terminal article being tipped with hairs.

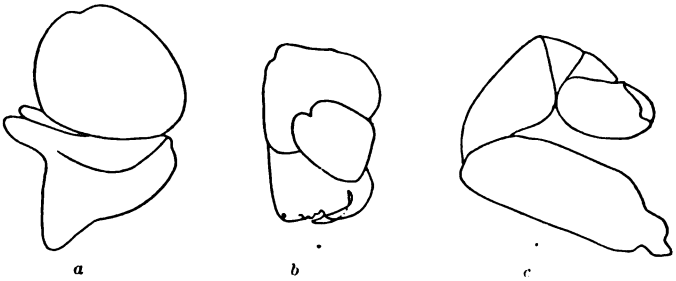

FIG. 584.—PHYLLODURUS ABDOMINALIS. *a*, FIRST INCUBATORY LAMELLA. × 27½. *b*, MAXILLIPED. × 27½. *c*, SEVENTH LEG. × 15½.

The seven segments of the thorax are distinct and taper gradually, becoming successively narrower.

The six abdominal segments are distinct. They taper gradually but rapidly to the small terminal segment which is posteriorly produced in a long, narrow process, which is a little longer than the basal part of the segment. The uropoda consist of a small branch on either side of the sixth or terminal segment and are attached at the place where the basal part of the segment gives rise to the long, narrow terminal process.

There are five pairs of single-branched pleopoda, a pair for each of the first five abdominal segments. They are in the form of narrow, elongated sacs, rounded at the extremity, and attached, one on each side, close to the lateral margin of the segments.

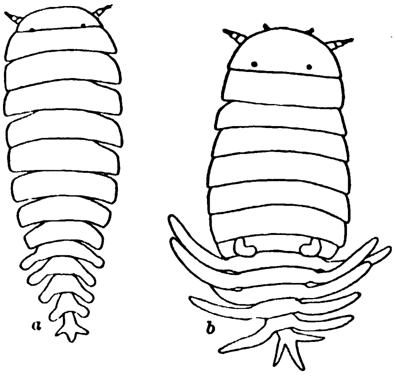

FIG. 585.—PHYLLODURUS ABDOMINALIS. *a*, MALE. *b*, YOUNG FEMALE.

The first abdominal segment bears on the dorsal surface two large rounded papillæ, one on either side, close to the lateral margin.

There are seven pairs of prehensile legs.

Dr. W. T. Calman says that he thinks it is characteristic for the males and females to be attached separately to the host. Only in one case did he find a male attached to the female. The label accompanying one male sent by Doctor Calman reads: "Found on the second pleopod of host."

The following description of the female is given by Stimpson:

This curious form of parasitic anisopods was found attached to and lying between the abdominal feet of the common *Gebia*, adhering by the sharp hook-shaped terminal joints of its feet, and perhaps aided in keeping its position by the sharp dorsal setæ of the abdomen. As might be expected from this external parasitism, the shape of the body is symmetrical, being never distorted, as is almost always the case in those forms which live in the usual position—in the confined space under the thoracic shield of the shrimp or crayfish.

In our species the thorax is somewhat cordate in shape, broadest behind, the short abdomen being set in the concavity. The thoracic segments are well separated and provided with distinct tumid epimera; the external envelope is soft, being even less hard and crustaceous than in *Argeia*. The head is somewhat broader than long, strongly tumid, and in the character of its appendages resembles somewhat that of *Ione*. The front projects abruptly, forming a horizontal margin to the head, beneath the anterior part of which the small inner antennæ are concealed. The outer antennæ arise laterally, and behind the inner ones, which they much exceed in length, being as long as half the width of the head. There are no thoracic branchial appendages. The thoracic feet are similar in character throughout; they gradually increase in length posteriorly, and are each provided with a small hand, the hooked finger of which is of moderate length, more than reaching the projecting inferior angle of the antepenultimate article.

The abdomen is triangular and consists of six deeply separated segments, the terminal one being very minute. The basal segment is much the largest, and bears upon its dorsal surface two papillæ, one on each side, which are provided with short, stiff, somewhat hooked setæ. The lateral extremities of the abdominal segments are split by a marginal furrow into superior and inferior rami; the latter being simply conical with two or three circular wrinkles; and the former (superior) each surmounted by a cylindrical pedicle which bears two large cultriform lamellæ. There are thus twelve pairs of these lamellæ, which are of large size, and being crowded, project in different directions, nearly concealing the posterior half of the animal. Each is about one-fifth as broad as long, compressed on the inner and thickened along the outer or convex edge. Only females of this species have as yet been found. The dimensions of one specimen are:

	Inch.
Length of body	0.58
Length of abdomen	.12
Length of superior abdominal appendages	.24
Breadth of thorax	.45

Several examples of this singular crustacean have been found on *Gebiæ* from Puget Sound and Tomales Bay.[a]

Lockington says: "The males do not live attached to the *Gebia*, but are free to rove." His description of the male is as follows:

Head semi-circular anteriorly, closely united to the succeeding segment. Third and fourth thoracic segments widest. Body oblong, boat-shaped, tapering slowly from the fourth to the seventh thoracic segment.

Outer antennæ 4-jointed; inner very small, reaching about to the middle of the second segment of the outer. Eyes too small to be distinguished by a Coddington lens. First abdominal segment a little narrower than last thoracic, but flat; succeeding segments tapering rapidly to the sixth or telson, which is pointed at the end and is provided on each side with a small lamella, giving the whole telson somewhat the appearance of a spearhead.

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[a] Bost. Journ. Nat. Hist., 1857, pp. 511-513.

The lateral laminæ of the first five abdominal segments round in sections instead of segmental as in the female, and considerably longer than the width of the segments to which they are attached.[a]

92. Genus ARGEIA Dana.

Body of female asymmetrical.

Ovarian bosses present on the first four segments of the thorax. Epimera present on all the segments; on the first four segments they are lateral to the ovarian bosses, and are in the form of narrow plates. The posterior portion of the lateral margins, in all the segments, are more or less produced, the length of the processes varying in each individual.

The segments of the abdomen are distinctly defined, and become gradually but rapidly narrower to the sixth or terminal segment, which is somewhat bilobed.

The pleopoda are five pairs of double-branched appendages; the outer branches are in the form of long, narrow lamellæ attached close to the lateral margins of the segments and forming a border surrounding the abdomen. The inner branches are in the form of small, rounded lamellæ, decreasing in size from the first to the last.

The uropoda are simple, in the form of two narrow, elongate lamellæ attached to the terminal segment and similar to the outer branches of the pleopoda.

All seven pairs of legs are present.

The male has all the segments of the abdomen fused. The pleopoda and uropoda are wanting. All seven segments of the thorax are distinct.

Branchial parasites.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ARGEIA.

a. Thoracic processes present on all the segments. Head large. Inner branches of all the pleopoda present. Incubatory lamellæ do not completely cover the marsupial pouch .... *Argeia pugettenis* Dana

a′. Thoracic processes apparently absent on some of the anterior segments. Head smaller than in *A. pugettensis*, and bilobate. Inner branches of the first three pairs of pleopods present; others wanting .... *Argeia pauperata* Stimpson.[b]

ARGEIA PUGETTENSIS Dana.

Argeia pugettensis Dana, U. S. Expl. Exp., Crust., XIV, 1853, p. 804, pl. LIII, fig. 7.—Stimpson, Bost. Jour. Nat. Hist., VI, 1857, p. 511.

Argeia sp.? Calman, Ann. N. Y. Acad. Sci., XI, 1898, p. 281.

Argeia pugettensis Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 868; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 337; American Naturalist, XXXIV, 1900, p. 308.

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[a] Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 57.

[b] The key is made from Stimpson's diagnosis of *Argeia pauperata*. I have seen no specimens of his species.

Argeia calmani Bonnier, Travaux de la Station Zool. de Wimereux, VIII, 1900, p. 329.

Argeia pugettensis Bonnier, Traveux de la Station Zool. de Wimereux, VIII, 1900, pp. 327-328.—Richardson, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 60-64; Bull. U. S. Fish Comm., XXIV, 1905, p. 220.

Localities.—On *Crago munita* (Dana), at Puget Sound; off Cape Beale, Vancouver Island. On *Crago alascensis* (Lockington), off Cape Seniavin, Alaska; at Davidson Bank, Alaska; east of Amak Island, Alaska; off Cape Strogonoff, Alaska; northwest of Unimak Island, Alaska; Kouloulak Bay, Alaska; off Columbia River, Oregon; Gulf of Georgia, British Columbia. On *Crago dalli* (Rathbun), south of Amak Island, Alaska. On *Crago alascensis elongata* (Rathbun), off Columbia River, Oregon. On *Nectocrangon ovifer* (Rathbun), off North Head, Akutan Island, Alaska; west of Pribilof Islands, Alaska. On *Crago franciscorum angustimana* (Rathbun), Straits of Fuca; Gulf of Georgia, British Columbia. On *Nectocrangon nigricauda* Stimpson, off Port Ano Nuevo, California. On *Nectocrangon crassa* Rathbun, off Cape Seniavin, Alaska; off Cape Newenham, Alaska; north of Bird Island, Shumagins, Alaska; Bering Sea, off the Pribilof Islands; Semidi Islands. On *Nectocrangon lar* (Owen), off Rakovaya Bay; Avatcha Bay; off Cape Strogonoff; off Kouloulak Bay and off Bristol Bay, Alaska; off Cape Menchikoff, Alaska; off Khoudoubine Islands, Alaska; off mouth of Yukon River. On *Nectocrangon alascensis* Kingsley, southwest of Hagemeister Island, Alaska; south and northwest of Unimak Island, Alaska; off Moorovskoy Bay, Alaska; Davidson Bank, Alaska; off North Head, Akutan Island, Alaska; south of San Diego Bay, California; off Rootook Island, Alaska; Petropaulovski, Kamchatka; off Kouloulak Bay, Alaska; between Bird and Nagai Islands; Unimak Pass; off Cape Johnson; southwest of Sannakh Islands, Alaska; off Grays Harbor, Washington; off Destruction

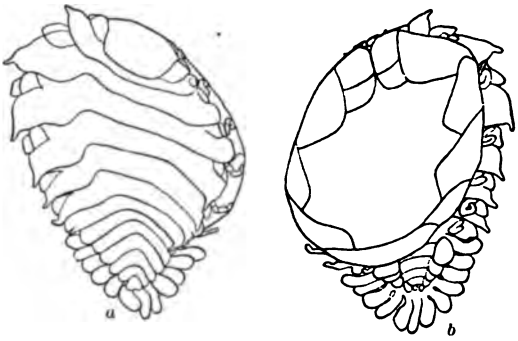

Fig. 586.—Argeia pugettensis. *a*, Dorsal view of adult female. *b*, Ventral view of adult female. × 14½.

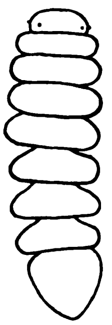

Fig. 587.—Argeia pugettensis. Male. × 22.

Island; Bering Sea, off Akutan Pass. On *Crago nigromaculata* (Lockington), at San Diego Bay, California; off Tillamook Rock, Oregon; Monterey Bay, California; off Cape Johnson. On *Crago communis* (Rathbun), off Grays Harbor, Washington; off Columbia River, Oregon; San Luis Obispo Bay, California; Iliuliuk Harbor, Unalaska; Straits of Fuca; south of San Diego Bay, California; off Rootook Island, Alaska; off Falmouth Harbor, Shumagins, Alaska; Bering Sea, off Akutan Island, northwest of Unimak Island, Alaska; off Point Arena, California; Washington Sound, Straits of Fuca, Washington. On *Nectocrangon dentata* Rathbun, at Kyska Harbor, Unalaska; Mazan Bay, Atka; Port Etches, Alaska; Port Levasheff, Unalaska; Iliuliuk Harbor, Unalaska, off Round Island, Coal Harbor, Unga Island; off Sitkalidak Island, Alaska. On *Crago alba* (Holmes), south of San Diego Bay, California; Gulf of Georgia, off Nanaimo, Vancouver Island, British Columbia; Kilisut Harbor, near Port Townsend, on *Crago alaskensis* (Lockington); Admiralty Inlet, vicinity of Port Townsend, on *Crago alascensis* (Lockington) and *Crago communis* (Rathbun); vicinity of Naha Bay, Behm Canal, southeast Alaska, on *Crago communis* (Rathbun) and *Nectocrangon dentata* (Rathbun).

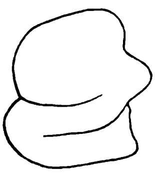

FIG. 588.—ARGEIA PUGETTENSIS. FIRST LAMELLA OF MARSUPIUM. × 14½.

Depth.—16 to 89 fathoms.

Immature specimens were found off Seal Islands, Alaska, on *Nectocrangon alascensis;* off Rootook Island, Alaska, on *Crago communis;* north of Bird Islands, Shumagins, Alaska; Gulf of the Farallones, California, on *Crago nigromaculata;* Coal Harbor, Unga Island, on *Nectocrangon dentata;* Captains Harbor, Unalaska, on *Nectocrangon dentata;* Sanborn Harbor, Nagai, Shumagins, on *Nectocrangon lar;* Mazan Bay, Atka, on *Nectocrangon crassa;* southwest of Hagemeister Island, Alaska, on *Nectocrangon alascensis;* northwest and northeast of Unimak Island, Alaska, on *Nectocrangon alascensis;* Bering Sea, between Pribilof Islands and Cape Newenham, on *Nectocrangon lar;* Kouloulak Bay, Alaska, on *Nectocrangon lar;* between Bristol Bay

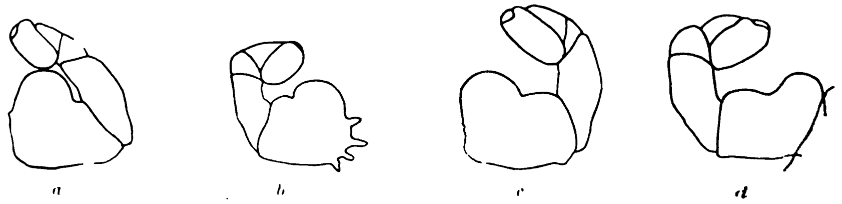

FIG. 589.—ARGEIA PUGETTENSIS. SIXTH LEG OF SPECIMENS FOUND ON: *a*, CRAGO NIGRICAUDA FROM OFF CAPE JOHNSON, WASHINGTON. × 27½. *b*, CRAGO COMMUNIS FROM STRAITS OF FUCA. × 27½. *c*, NECTOCRANGON CRASSA FROM OFF CAPE NEWENHAM, ALASKA. × 27½. *d*, NECTOCRANGON CRASSA FROM ALASKA. × 27½.

and Pribilof Islands, Alaska, on *Nectocrangon lar;* Arctic Ocean, on *Nectocrangon lar;* Popoff Straits, on *Nectocrangon crassa;* between Bird and Nagai Islands, on *Nectocrangon alascensis.*

List of Crangonidæ on which *Argeia pugettensis* is found parasitic:

Nectocrangon ovifer Rathbun.
Nectocrangon lar (Owen).
Nectocrangon alascensis Kingsley.
Nectocrangon crassa Rathbun.
Nectocrangon dentata Rathbun.
Crago nigromaculata (Lockington).
Crago franciscorum angustimana (Rathbun).
Crago dalli (Rathbun).
Crago communis (Rathbun).
Crago propinqua (Stimpson).
Crago nigricauda (Stimpson).
Crago alascensis (Lockington).
Crago alascensis elongata (Rathbun).
Crago alba (Holmes).
Crago munita (Dana).

Immature forms.—A female (probably in the first post-larval stage) has the thoracic processes well developed, sometimes only on one side.

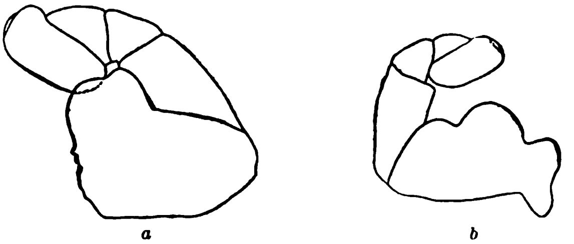

Fig. 590.—Argeia pugettensis. Sixth leg of specimens found on: *a*, Nectocrangon dentata from Afognak Bay, Afognak Island. × 39. *b*, Nectocrangon crassa from Cape Newenham, Alaska. × 20¼.

The inner pleopoda of the first pair are usually present; all the outer pleopoda, the other four inner pleopoda, and the uropoda are not

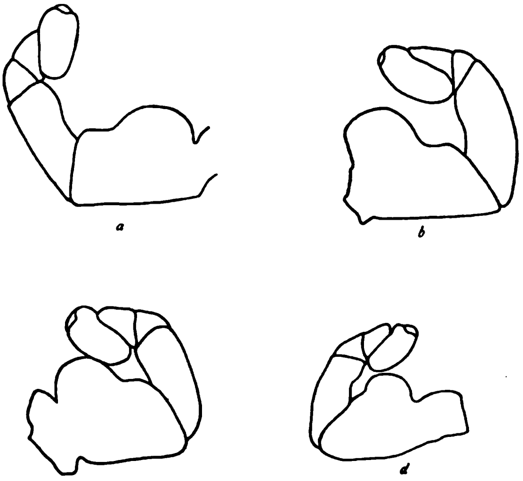

Fig. 591.—Argeia pugettensis. Seventh leg of specimens found on: *a*, Nectocrangon alascensis from southwest of Sannakh Islands. Alaska. × 41. *b*, Crago nigromaculata from San Diego Bay, California. × 41. *c*, Crago dalli from south of Amak Island, Alaska. × 41. *d*, Crago communis from Akutan Island, Bering Strait. × 41.

developed at this stage. The marsupial plates are small and just developing. The male is similar to the male found on adult female.

Immature female of a more advanced stage has the thoracic processes well developed, although perhaps not quite as long as in the preceding stage. The outer pleopoda and uropoda are small, but all developed. The first two inner pleopoda are present; the other three may or may not be present. When present they are usually smaller than the first two, decreasing in size to the fifth pair, and sometimes difficult to discern. The marsupial plates are larger than in the preceding stage, but not fully developed. The incubatory pouch never carries eggs in either of these stages. The male is similar to the male of the adult female.

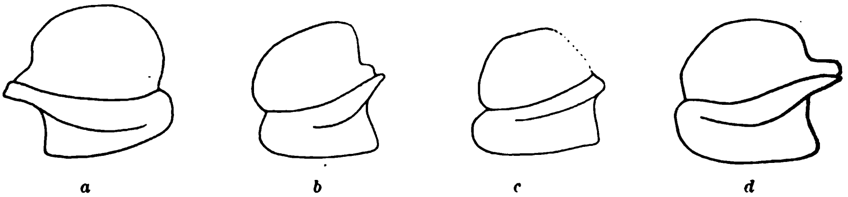

FIG. 592.—ARGEIA PUGETTENSIS. FIRST INCUBATORY PLATE FROM SPECIMENS FOUND ON: *a*, NECTOCRANGON CRESSA FROM OFF CAPE NEWENHAM, ALASKA. × 9½. *b*, NECTOCRANGON CRASSA FROM ALASKA. × 9½. *c*, CRAGO NIGROMACULATA FROM SAN DIEGO BAY, CALIFORNIA. × 9½. *d*, CRAGO NIGRICAUDA FROM OFF CAPE JOHNSON. × 9½.

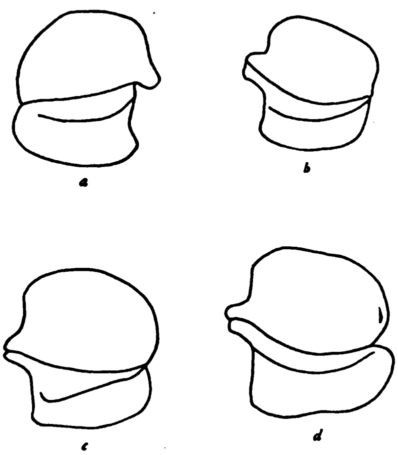

FIG. 593.—ARGEIA PUGETTENSIS. FIRST INCUBATORY LAMELLA FROM SPECIMEN FOUND ON: *a*, CRAGO COMMUNIS FROM STRAITS OF FUCA. × 14. *b*, CRAGO COMMUNIS FROM AKUTAN ISLAND, ALASKA. × 14. *c*, NECTOCRANGON ALASCENSIS FROM SOUTHWEST OF SANNAKH ISLANDS, ALASKA. × 14. *d*, CRAGO DALLI FROM SOUTH OF AMAK ISLAND. × 14.

Specimens of both immature stages were found on the same species and genera of host as the adult females.

A male in the cryptoniscan stage was found on one immature female (in first post-larval stage).

Thoracic processes of adult female.—In the adult female the thoracic processes may be quite reduced. In some specimens these processes are well developed, though never in all the specimens examined were they found as long as in the very young female or as in the figure given by Dana of the adult female. In other specimens these processes are very small, and yet in many they were not even present. Not only is this variation found in specimens taken from different species and genera of host, but it is also true of those found on the same species and genus of host. As a result of this observation on a large number of these forms, the conclusion must be maintained that these thoracic processes, well developed in the young female, of varying size and shape and sometimes so reduced as to be practically absent in the adult female, have no specific value whatever. Giard and Bonnier have described their function as organs of fixation, which seems a reasonable conclusion and one capable of explaining why so much variation occurs in this respect with each individual parasite.

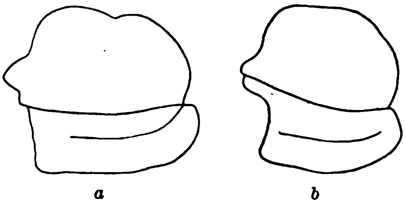

FIG. 594.—ARGEIA PUGETTENSIS. FIRST INCUBATORY LAMELLA FROM SPECIMENS FOUND ON: *a*, NECTOCRANGON DENTATA FROM AFOGNAK BAY, AFOGNAK ISLAND. × 11¼. *b*, NECTOCRANGON CRASSA FROM OFF CAPE NEWENHAM, ALASKA. × 9¼.

Body of adult female somewhat asymmetrical. Length, 14 mm.; width, 11 mm.

Head wider than long, 2 mm. : 3½ mm., somewhat bilobed, with a narrow frontal border, the anterior margin of which is slightly arched or rounded. The frontal border projects at the side in a small angular lobe. Eyes absent. The first pair of antennæ are composed of two articles—a large basal article and a small terminal one. The second pair are composed of four articles. Both are small and not conspicuous on the dorsal side.

All seven segments of the thorax are distinct. Ovarian bosses are present on the first four segments, where they occupy the sub-lateral portion of the anterior part of the lateral margin. The epimera are narrow plates lateral to the ovarian bosses on the anterior part of the segments. The epimera also occupy the anterior part of the lateral margin of the last three segments, but the ovarian bosses are not present on these segments. The posterior lobes on all the segments are large and irregular in outline, and more or less produced in narrow, somewhat elongated processes, these processes being usually more developed on one side (the longer side) than on the other.

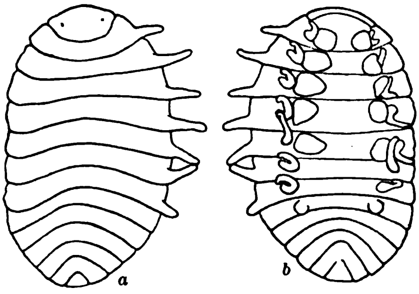

FIG. 595.—ARGEIA PUGETTENSIS. *a*, DORSAL VIEW OF IMMATURE FEMALE. *b*, VENTRAL VIEW OF SAME. × 10. (FIRST POST-LARVAL STAGE.)

All six segments of the abdomen are distinct. The lateral parts are not developed in any of the segments. The sixth or terminal segment is small and posteriorly truncate. The uropoda are a pair of simple, single-branched lamellæ, somewhat elongated, with outlines irregular, and attached to the sixth abdominal segment. There are five pairs of double-branched pleopoda. The outer branches are elongated lamellæ, similar in shape to the uropoda, and are placed close to the lateral margins of the segments on the underside, so that in a dorsal view they appear attached to the lateral margins of the segments. They form a border around the abdomen. The inner branches are rounded, sac-like bodies, usually decreasing in size from the first to the last.

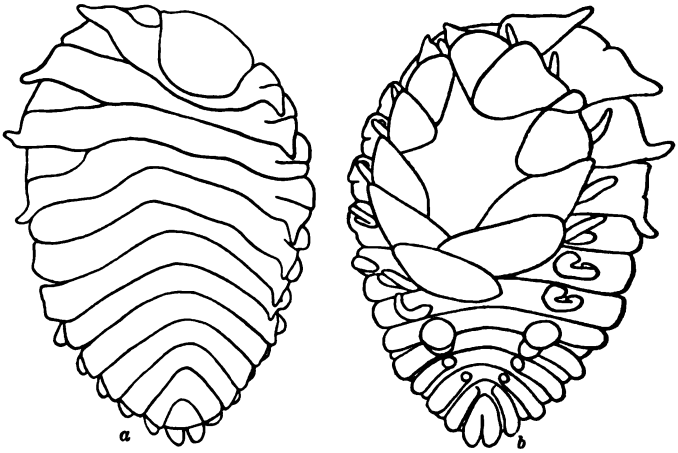

FIG. 596.—ARGEIA PUGETTENSIS. *a*, DORSAL VIEW OF IMMATURE FEMALE. *b*, VENTRAL VIEW OF SAME. × 14½. (SECOND POST-LARVAL STAGE.)

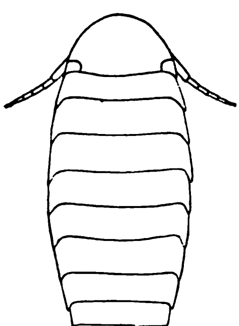

FIG. 597.—ARGEIA PUGETTENSIS. (CRYPTONISCAN STAGE.)

There are five pairs of incubatory lamellæ which do not completely inclose the marsupial pouch. The distal part of the first pair has the posterior margin not produced in a lobe.

The legs are all prehensile. The basis of all seven pairs is provided with a high rounded carina.

The male is narrow, elongate, symmetrical in outline, 5½ mm. long and 1½ mm. wide. Eyes are present. The anterior margin of the head is widely rounded. The first pair of antennæ are composed of three articles. The second pair are composed of four articles. All the thoracic segments are distinct. The lateral margins are straight, but not contiguous. All seven pairs of legs are prehensile. The segments of the abdomen are coalesced in a single segment, narrower than the thorax, which tapers to a point. It is 1 mm. wide and 1½ mm. long. There are no uropoda and no pleopoda.

The individual described was found in the branchial cavity of *Nectocrangon lar*.

ARGEIA PAUPERATA Stimpson.

Argeia pauperata STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 511.

Argeia depauperata[a] RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 868; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 337; American Naturalist, XXXIV, 1900, p. 308.

Argeia pauperata BONNIER, Trav. de la Station Zool. de Wimereux, VIII, 1900, p. 328.

Argeia depauperata RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 64.

Locality.—San Francisco Bay, on *Crago franciscorum*.

"This species is somewhat larger than the preceding (*Argeia pugettensis* Dana); the head is comparatively smaller, more tumid, and bilobate; the egg-pouch covers the eggs more completely; and the thoracic branchial appendages are apparently absent in some of the anterior segments. The inner branches of the first three pairs of abdominal appendages are broader; those of the last three pairs are wanting. Length, 0.35; breadth, 0.23 inch. This description is taken from a female. Found in specimens of *Crago franciscorum*, from San Francisco Bay."—STIMPSON.[b]

93. Genus PARARGEIA Hansen.

Branchial parasites.

Female with thoracic processes wanting on all the segments.

Abdomen without pleural lamellæ, the lateral parts not developed.

There are five pairs of biramous pleopoda; the outer branches are elongate and attached close to the lateral margins of the segments; the inner branches are small, oval.

Uropoda simple, single-branched.

Male with all the segments of the thorax distinct. The segments of the abdomen are fused in a large rounded, oval, terminal piece, which has a prominent median dorsal tubercle near the base.

PARARGEIA ORNATA Hansen.

Parargeia ornata HANSEN, Bull. Mus. Comp. Zool. Harvard College, XXXI, 1897, pp. 120–122, pl. VI, figs. 1–2.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 869; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 338.—BONNIER, Travaux de la Station Zool. de Wimereux, VIII, 1900, pp. 329–332.—RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 64.

Locality.—Off Acapulco, Mexico, on *Sclerocrangon procax* Faxon.

Body of female somewhat asymmetrical; length 8 mm.; width 7 mm.

Head wider than long, 1½ mm.: 2 mm. Front of head with a marginal border somewhat upcurved and anteriorly arcuate. Eyes absent. The first pair of antennæ are composed of three articles, the last of which is very minute. The second pair of antennæ are composed of four articles, the last article being also minute.

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[a] By error.

[b] Bost. Jour. Nat. Hist., VI, 1857, p. 511.

The first four segments of the thorax have the lateral parts longer than the middle of the dorsal region. The epimera of the first four segments are placed on the anterior half of the lateral margin, lateral to the ovarian bosses; they are distinct and well developed on one side of the body, but small on the opposite side. Ovarian bosses are present on all the segments, occupying the anterior half of the lateral margin, and placed on the inner side of the epimera. Epimera are not present on the last three segments of the thorax, and the ovarian bosses occupy the entire upper portion of the lateral margin, being produced on one side of the body in large rounded lobes. The posterior half of the lateral margin forms a large and conspicuous lobe or expansion on all the segments.

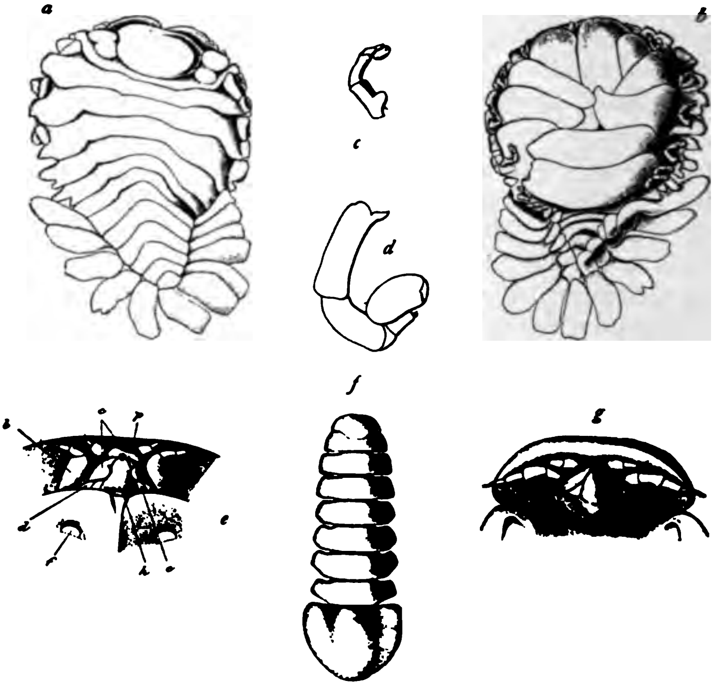

FIG. 598.—PARARGEIA ORNATA (AFTER HANSEN). *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF FEMALE. *c*, LEG OF SEVENTH PAIR OF FEMALE. *d*, LEG OF SEVENTH PAIR OF MALE. *e*, HEAD OF FEMALE (VENTRAL VIEW). *f*, DORSAL VIEW OF MALE. *g*, HEAD OF MALE (VENTRAL VIEW).

All six segments of the abdomen are distinct, and they gradually decrease in size from the first to the last segment, which is rounded posteriorly. The lateral parts of these segments are not developed. The uropoda are simple and single-branched, and consist of two elongated lamellæ attached to the sixth abdominal segment. There are five pairs of double-branched pleopoda attached to the first five segments.

The outer branch of each pleopod is elongate and simulates the uropoda in appearance. The outer branches are all similar in shape and of nearly equal size. The inner branches are small, elongated or rounded, and sac-like. They are not conspicuous in a dorsal view, whereas the outer lamellæ form a conspicuous border around the abdomen, where they seem to be attached to the lateral margins of the segments.

There are five pairs of incubatory lamellæ which entirely inclose the marsupial cavity, the lamellæ overlapping in the medial ventral line. The basis of all the legs is furnished with a high rounded carina.

The male is 4½ mm. long and 1½ mm. wide in the region of the thorax. The abdomen at the base is 2 mm. wide. The anterior margin of the head is rounded. The eyes are absent. The first pair of antennæ are composed of three articles. The second pair are composed of five or six articles. All seven segments of the thorax are distinct. The legs are all prehensile.

The segments of the abdomen are consolidated in a single segment, which is wider at the base than the segments of the thorax. Its posterior margin is widely rounded. Near the base of the segment is a single prominent tubercle in the median line. There are no pleopoda nor uropoda.

94. Genus PROBOPYRUS Giard and Bonnier.

Segments of abdomen in female dorsally defined; lateral parts or pleural lamellæ not developed.

Five pairs of double-branched pleopods are present.

Uropoda wanting.

Segments of abdomen in male fused dorsally, but defined on the lateral margins. Five pairs of small tuberculiform pleopods present. Uropoda wanting.

Branchial parasites.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS PROBOPYRUS.

a. Male with the first four segments of the abdomen defined laterally by deep incisions, the last two fused in a large and broad terminal piece. *Probopyrus pandalicola* (Packard)

a′. Male with all the segments of the abdomen defined laterally by deep incisions.

  b. Species large. First incubatory lamella with the distal segment produced posteriorly in a lobe at the outer angle.

    c. Abdomen of male nearly as long as broad...*Probopyrus floridensis* Richardson

    c′. Abdomen of male nearly twice as broad as long.

      d. Body of male wide, thick-set; head and thorax two and a half times or less longer than abdomen....................*Probopyrus bithynis* Richardson

      d′. Body of male narrow; head and thorax three and a half times longer than abdomen....... ....*Probopyrus alphei* Richardson

  b′. Species small. First incubatory lamella with the distal segment produced posteriorly at the inner angle...............*Probopyrus latreuticola* (Gissler)

PROBOPYRUS PANDALICOLA (Packard).

Bopyrus (?) LEIDY, Proc. Acad. Nat. Sci. Phila., 1879, Pt. 2, p. 198.—HARGER, Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, p. 312.

Bopyrus pandalicola PACKARD, Zoology for Students and General Readers, 1879, pp. 308–309.

Bopyrus palæmoneticola PACKARD, Zoology for High Schools and Colleges, 1881, p. 289.

Bopyrus manhattensis GISSLER, Scientific American, XLV, Sept. 3, 1881, p. 151.

Bopyrus palæmoneticola GISSLER, American Naturalist, XVI, 1882, pp. 6–12.

Probopyrus palæmoneticola GIARD and BONNIER, Bull. Scient., XIX, 1888, p. 4.—STEBBING, Hist. Crust., 1893, p. 416.

Bopyrus palæmoneticola RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 578.

Probopyrus palæmoneticola BONNIER, Travaux de la Station Zool. de Wimereux, VIII, 1900, pp. 342–343, pl. XXXI.—RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 66.—PAULMIER, Bull. New York State Museum, 1905, pp. 185–186.

Localities.—Atlantic City, on *Palæmonetes vulgaris* Say; from New Hampshire to Florida, on *P. vulgaris;* East Providence, Rhode Island, on *P. vulgaris;* Acushnet River, Massachusetts, on *P. vulgaris;* Baldwin Lodge, Mississippi, on *Palæmonetes* sp.; Latana, Florida, on *Palæmonetes;* Brooklyn, New York.

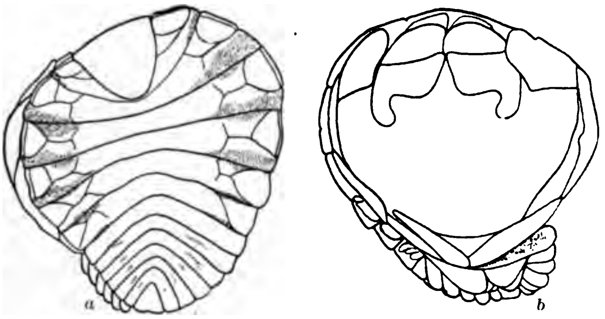

FIG. 599.—PROBOPYRUS PANDALICOLA. *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF SAME. × 4.

Description.—Color of body white, with patches of black on the lateral margins of all the thoracic segments on both sides of the body. Head and abdomen also with a few scattered black markings. Legs of both sides white; patches of black on the ventral side of the lateral margins of both sides of the thorax. Incubatory lamellæ with patches of black on all the plates of both sides.

Head deeply set in thorax; anterior margin straight; posterior margin rounded. Eyes wanting. Ovarian bosses present on the first four segments of the thorax at the anterior part of the sublateral margin; epimera evident as narrow plates lateral to the ovarian bosses. The epimera occupy the entire lateral margins on the last three segments. The segments of the abdomen are distinct. The terminal segment is broad, more or less bilobed. The pleopoda consist of five pairs of double-branched lamellar appendages, closely crowded together on the ventral side of the abdomen.

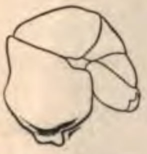

FIG. 600.—PROBOPYRUS PANDALICOLA. LEG OF SIXTH PAIR OF ADULT FEMALE. × 39.

The five pairs of incubatory lamellæ surround a large open area normally filled with eggs. The first pair have the terminal lobe of the distal segment large, well defined, and incurved.

All the legs have a high quadrangularly shaped expansion or carina on the basis.

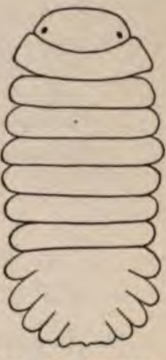

FIG. 601.—PROBOPYRUS PANDALICOLA. MALE. × 41.

Male with all the segments of the thorax distinct, and with the lateral margins contiguous. First four segments of the abdomen well defined at the sides, but fused in the middle of the dorsal surface. The last two segments form a single large piece, the fused terminal segment being indicated only by a small median point on the posterior margin. The body is a little more than twice as long as wide. Eyes are present. The rudimentary pleopoda are pairs of small oval processes, one pair on each abdominal segment. The abdomen is about one and a half times as broad as long.

PROBOPYRUS FLORIDENSIS Richardson.

Probopyrus floridensis RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 70–71.

Locality.—Satsuma Island, above St. John's River, Florida, on *Palæmonetes exilipes* Stimpson.

Body of female light brown, with the head, abdomen, ovarian bosses, and epimera light yellow, almost white. Markings of black are present all over thorax and a few black lines are present on the abdomen. The incubatory lamellæ are almost entirely covered with black markings, so that the color is uniformly dark. The lateral parts of the thorax on the ventral side have markings of black, those of one side being in patches with yellow areas separating them, all the legs of this side being yellow. The legs of the opposite side are dark.

Head deeply set in thorax, broad anteriorly with frontal margin nearly straight; posterior margin narrowly rounded; eyes wanting.

The segments of the thorax are distinct. Ovarian bosses are prominent on the anterior portion of the sublateral margin of the first four segments; the epimera are present as narrow plates lateral to the ovarian bosses. On the last three segments the epimera occupy the whole of the lateral margin.

The segments of the abdomen are distinctly separated on the dorsal side. The lateral margins are narrowly rounded. The terminal segment of the body is long and narrow, reaching beyond the lateral margins of the fifth segment; it is rounded posteriorly, and with or without a minute excavation.

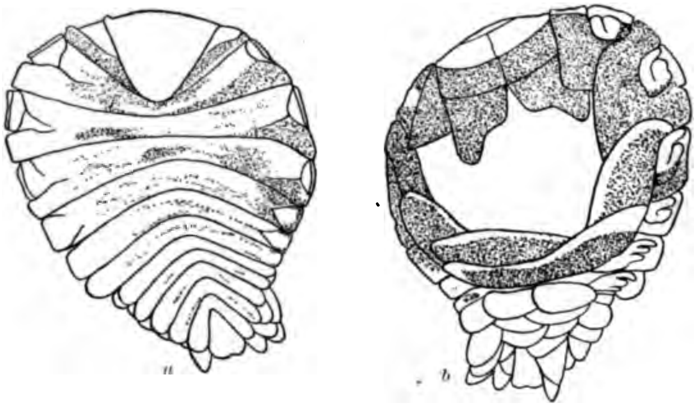

Fig. 602.—Probopyrus floridensis. *a*, Dorsal view of female. *b*, Ventral view of same. × 12.

The pleopoda consist of five pairs of double-branched lamellar appendages.

The incubatory lamellæ are large, encircling the incubatory pouch, leaving only a small opening into the interior. The first pair of plates have the terminal lobe of the distal segment straight.

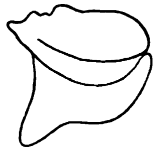

Fig. 603.—Probopyrus floridensis. First lamella of marsupium. × 10.

All the legs have a well rounded expansion or carina about the middle of the basis.

Male with all the segments of the thorax well defined and widely separated at the sides. Body narrow, elongate, nearly three times as long as wide. The abdomen has all the segments well defined at the sides, but fused in the middle of the dorsal surface. Length almost equal to the breadth. Terminal segment well defined, rounded posteriorly, and extending beyond the lobes of the preceding segment. The lateral margins of all the segments are rounded. Pleopoda are present in the form of pairs of small rounded processes, a pair on each segment of the abdomen. Eyes present.

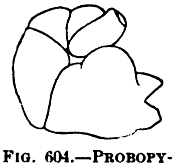

Fig. 604.—Probopyrus floridensis. Leg of sixth pair of adult female. × 39.

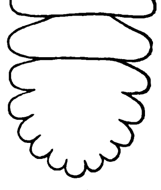

Fig. 605.—Probopyrus floridensis. Male. × 41.

One specimen was collected by Mr. W. C. Kendall at Satsuma Island, above St. Johns River, Florida; parasitic on *Palæmonetes exilipes* Stimpson. Two other specimens were obtained by the U. S. Bureau of Fisheries steamer *Albatross* at Little River, Miama, Florida; parasitic also on *Palæmonetes exilipes* Stimpson.

Type.—Cat. No. 29090, U.S.N.M.

PROBOPYRUS BITHYNIS Richardson.

Probopyrus bithynis Richardson, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 68–70.

Localities.—Mississippi River near the exposition grounds in New Orleans, Louisiana, on *Bithynis ohionis* (Smith); Escondido River, Nicaragua, 50 miles from Bluefields, on *Bithynis acanthurus* (Wiegmann).

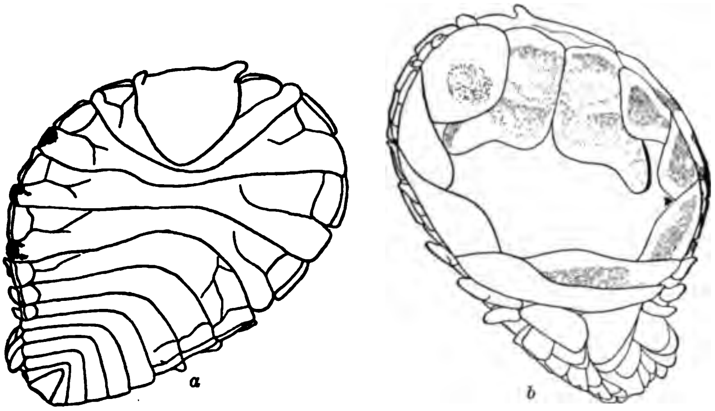

Fig. 606.—Probopyrus bithynis. *a*, Dorsal view of female. *b*, Ventral view of same. × 16

Body of female with dorsal surface perfectly white, having only three small patches of black on one side at the post-lateral parts of the second, third, and fourth thoracic segments. Ventral side of the body with the first pair of incubatory lamellæ almost entirely covered with patches of black, and with all the other lamellæ of one side having patches of black, those of the other side being without these patches, with the exception in some specimens of the second lamella. Patches of black also present on the ventral side of the lateral margins of the second, third, and fourth thoracic segments of one side—the same side on which these markings occur on the dorsal surface and to which the incubatory lamellæ, likewise marked with patches, are attached. Legs of both sides white and without any markings.

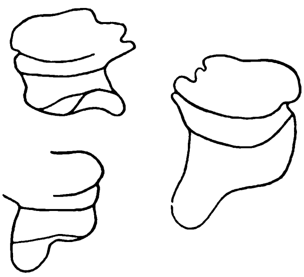

Fig. 607.—Probopyrus bithynis. First lamella of marsupium, right side. × 10.

Head with the antero-lateral corners produced into prominent processes; anterior margin between these processes straight; posterior margin narrowly rounded. Length of head about equal to its breadth. Eyes wanting.

The thoracic segments are distinctly defined. Ovarian bosses are present on all the segments, occupying only the anterior portion of the sublateral margin of the first four segments. The epimera are evident as narrow pieces lateral to the ovarian bosses on all the segments.

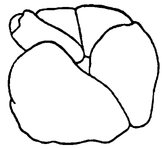

FIG. 608.—PROBOPYRUS BITHYNIS. LEG OF SIXTH PAIR OF ADULT FEMALE. × 39.

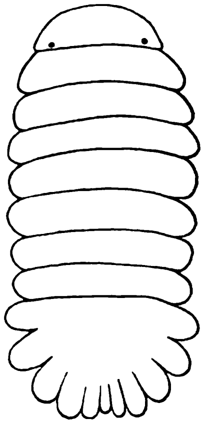

FIG. 609.—PROBOPYRUS BITHYNIS. MALE. × 41.

The segments of the abdomen are distinct on the dorsal side. The lateral margins of the first five segments are straight. The sixth or terminal segment is narrow, elongate, and has a slight emargination in the middle of the posterior margin.

The pleopoda are five pairs of double-branched appendages, the inner branches of the first pair being the largest and overlapping in the middle ventral line. The uropoda are wanting.

The first pair of incubatory lamellæ are large and extend about half the length of the ventral side of the thorax. In fact all the lamellæ are quite large, and encompass the marsupium, leaving only a comparatively small opening into the pouch.

All the legs have an extremely high expansion or carina on the basis.

The male has the thorax distinctly segmented, the segments not being widely separated at the sides. Body of male short and thickset, being only twice as long as wide.

The abdomen is a little more than one and a half times broader than long. The segments of the abdomen are only indicated at the sides,

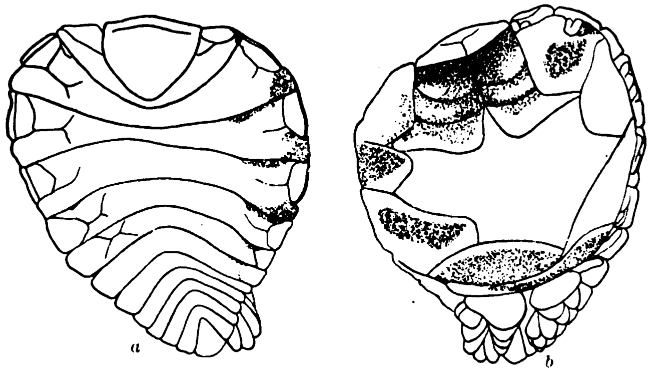

FIG. 610.—PROBOPYRUS BITHYNIS. a, DORSAL VIEW OF FEMALE. b, VENTRAL VIEW OF SAME. × 8.

being fused in the middle of the dorsal surface; they gradually decrease in size to the sixth or last, which is a narrow piece situated between the two lobes of the fifth segment and which does not reach to the extremity of those lobes. Eyes present. Body with markings of brown.

Six specimens of this species were taken by the U. S. Bureau of Fisheries steamer *Albatross* from the Mississippi River near the Exposition grounds in New Orleans, Louisiana. Parasitic on *Bithynis ohionis* (Smith).

Type.—Cat. No. 29089, U.S.N.M.

About 6 specimens which should probably be referred to this species were found in Escondido River, Nicaragua, 50 miles from Bluefields, by Dr. C. W. Richmond; they are parasitic in the branchial cavity of *Bithynis acanthurus* (Wiegmann).

They differ from the type as above described in having no antero-lateral processes to the head of the female; in having patches of black on the lateral margins of all the segments of the thorax on one side of the body; and in having sometimes the third and also the fourth lamellæ of the incubatory pouch with patches of black.

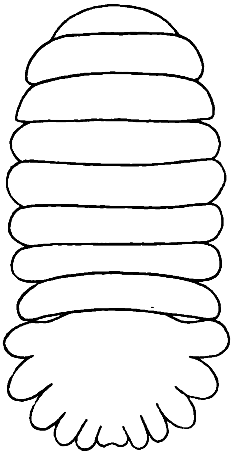

FIG. 611.—PROBOPYRUS BITHYNIS. MALE. × 41.

In the male the terminal segment has in some specimens a tendency to be bilobed.

PROBOPYRUS ALPHEI Richardson.

Bopyrus sp.? FRITZ MÜLLER, Jenaische Zeitschrift, VI, 1871, p. 68.

Bopyrus alphei GIARD and BONNIER, Bull. Scient., XXII, 1890, p. 369 (nomen nudum).

Bopyrus alphei RICHARDSON, Proc. Wash. Acad. Sci., II, 1900, pp. 158–159.

Gyge sp.? H. V. WILSON, American Naturalist, XXXIV, 1900, p. 353.

Bopyrella alphei BONNIER, Trav. de la Station Zool. de Wimereux, VIII, 1900, p. 352.

Probopyrus alphei RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 67–68.

Localities.—Beaufort, North Carolina, on *Crangon heterochælis;* mangroves, Rio Parahyba do Norte, Brazil, on *Crangon heterochælis;* Desterro, Brazil, on an undetermined species of *Crangon* (Müller).

The body of the female is broadly oval, its greatest width being equal to its length, broadened anteriorly and narrowed posteriorly. Head widening posteriorly, its antero-lateral angles being produced into lobes, directed upward. Eyes absent. The thoracic segments have their lateral margins somewhat elevated and contiguous. The abdominal segments are not contiguous along the lateral margins, but are separated by broad lateral incisions.

The incubatory lamellæ are very wide apart, surrounding a broad open space, the marsupium, on the ventral side of the body.

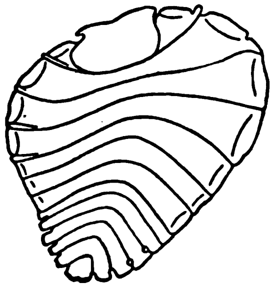

FIG. 612.—PROBOPYRUS ALPHEI. DORSAL VIEW OF FEMALE.

There are five pairs of double-branched pleopoda, lamellar in shape and placed on either side of the median line. Uropoda absent.

Color, white.

Male, oblong oval. Eyes wanting. Thoracic segments well defined. Abdominal segments imperfectly defined, except along the lateral margins. Color white.

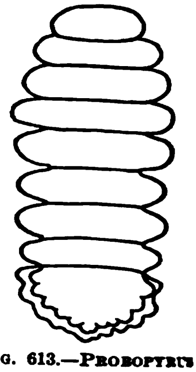

FIG. 613.—PROBOPYRUS ALPHEI. MALE.

Type locality.—Mangroves, Rio Parahyba do Norte, Brazil, in the branchial cavity of *Crangon heterochælis* Say. Cat. No. 23759, U.S.N.M.

PROBOPYRUS LATREUTICOLA (Gissler).

Bopyroides latreuticola GISSLER, American Naturalist, XVI, 1882, pp. 591–594.

Bopyrus latreutes SPENCE BATE, Challenger Report, XXIV, 1888, p. 584.

Bopyrina latreuticola BONNIER, Travaux de la Station Zool. de Wimereux, VIII, 1900, pp. 370–373.

Bopyroides latreuticola RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, p. 299; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 65–66.

Localities.—Beaufort, North Carolina, on *Latreutes ensiferus* (Milne Edwards); latitude 28° 17′ 7″ north, longitude 66° 17′ 37″ west; latitude 31° 15′ 42″ north, longitude 67° 39′ 10″ west on *L. ensiferus;* latitude 31° 16′ north, longitude 71° 50′ west on *L. ensiferus;* latitude 27° 38′ north, longitude 76° 23′ 24″ west on *L. ensiferus;* Bahamas, between Nassau and Andros on *L. ensiferus;* off South Carolina, on *L. ensiferus;* Bermudas, on *L. ensiferus.*

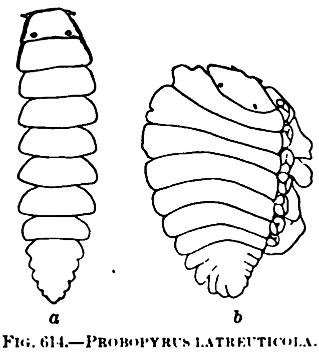

FIG. 614.—PROBOPYRUS LATREUTICOLA. *a*, MALE. × 51¼. *b*, FEMALE. × 18¾.

Body of female ovate, asymmetrical, one and a half times longer than broad, 2 mm.: 3 mm.

Head deeply set in first thoracic segment; with a frontal border, the anterior margin of which is widely rounded, and the lateral angles of which project as triangular lobes at the sides of the head. Eyes distinct and situated just below the frontal border.

On one side of the body the segments of the thorax have the lateral parts large and expanded. On the shorter side they are less expanded and upcurved, showing the legs. Ovarian bosses are not present on any of the segments. The lateral margins of all the segments of the expanded side are entire with the exception of the second, which has a decided notch separating the anterior two-thirds from the posterior third. The epimera seem to be perfectly coalesced in all the segments with the dorsal part of the segments.

The segments of the abdomen are all fused in the middle of the dorsal surface. On the shorter side of the body there is no indication of the segments, the lateral margin being straight and continuous. On the opposite side, however, five distinct segments are marked off from the terminal lobe by five deep notches. There are five pairs of double-branched pleopoda in the form of small, rounded lamellæ. No uropoda are developed. The five pairs of incubatory lamellæ do not completely inclose the marsupial pouch. The plates are small and bound only the lateral parts of the marsupium. The distal segment of the first pair is posteriorly rounded. There are seven pairs of legs, all equally well developed and having prehensile hands.

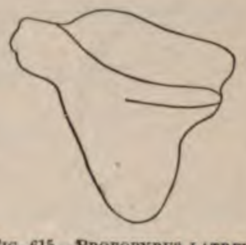

FIG. 615.—PROBOPYRUS LATREUTICOLA. FIRST INCUBATORY LAMELLA. × 51⅗.

The male is oblong-ovate. The anterior margin of the head is widely rounded. Eyes are distinct. The seven segments of the thorax are distinct and have the lateral margins rounded. The segments of the abdomen are fused in the middle, but are all distinctly marked at the sides. Five deep notches separate the first five segments from each other and from the sixth or terminal segment, which has the posterior margin produced in three small lobes, one median and one on either side, all in a transverse line. There are no uropoda nor pleopoda. The abdomen is not abruptly narrower than the thorax.

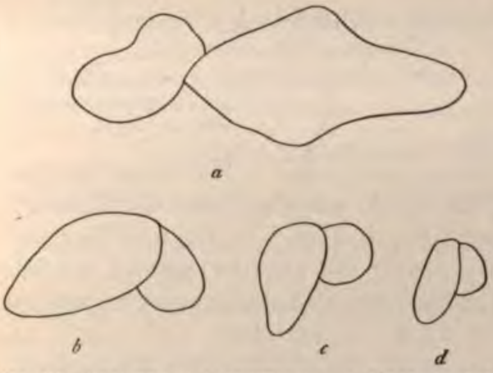

FIG. 616.—PROBOPYRUS LATREUTICOLA. *a*, FIRST PLEOPOD (SHOWING BOTH BRANCHES). × 54⅗. *b*, SECOND PLEOPOD. × 103⅛. *c*, THIRD PLEOPOD. × 103⅛. *d*, FOURTH PLEOPOD. × 103⅛.

The specimen described is found parasitic on *Latreutes ensiferus* (Milne Edwards).

98. GENUS BOPYRISCUS, new genus.

Very close to *Probopyrus*.

First four segments of abdomen distinct in female; last two segments fused. Pleopods consist of five pairs of double-branched lamellæ. Uropoda absent. Distal segment of first lamellæ of marsupium produced in a small lobe.

Male with first three segments of abdomen distinct; last three fused in the terminal piece, which is trilobate. Uropoda absent.

BOPYRISCUS CALMANI, new species.

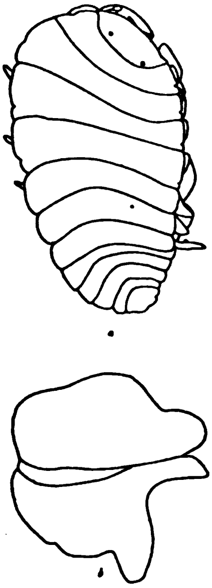

FIG. 617.—BOPYRISCUS CALMANI. *a*, FEMALE. × 11⅔. *b*, FIRST INCUBATORY LAMELLA. × 33.

Body somewhat asymmetrical, turned more or less to one side, which is shorter than the other side; longer than wide, 5 mm.: 3 mm.

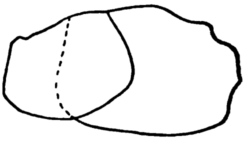

FIG. 618.—BOPYRISCUS CALMANI. FIRST PLEOPOD. FEMALE. × 77½.

Head deeply set in thorax, wider than long, with the front nearly straight or but slightly rounded, and the antero-lateral angles acute. Eyes are present in the form of black pigment. The first pair of antennæ are small and are composed of three articles. The second pair are also small, and composed of only a few articles.

The seven segments of the thorax are distinct. The lateral margins of the first four are bilobate; the lateral margins of the last three are straight. Ovarian bosses are faintly indicated on the first four segments where they occupy the anterior part of the lateral margin. Lateral to them are the narrow epimeral plates, which are but faintly indicated.

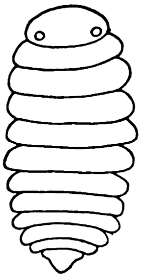

FIG. 619.—BOPYRISCUS CALMANI. MALE. × 39.

The first four segments of the abdomen are distinct, being separated by faint lines; the last two segments are fused, the line separating them being obliterated.

There are no uropoda. The pleopoda consist of five pairs of double-branched, small rounded lamellæ.

There are five pairs of incubatory lamellæ that do not completely inclose the incubatory pouch. The first pair have the distal segment produced at the extremity in a small lobe.

The male has the frontal margin of the head rounded. Eyes distinct, situated near the posterior margin. All seven segments of the thorax distinct. The first three segments of the abdomen are distinct; the last three are fused in the terminal piece, which is trilobate, a lateral lobe on either side and a larger median posterior lobe.

There are no uropoda. This species is named for Dr. W. T. Calman, the Scotch naturalist.

Only one specimen was collected by the U. S. Bureau of Fisheries steamer *Albatross* at Station 4421, between Santa Barbara and San Nicolas, California.

The type is in the U. S. Nat. Museum. Cat. No. 32073.

96. Genus BOPYRINA Kossmann.

Branchial parasites.

Female with segments of abdomen fused in the middle, more or less defined at the sides; lateral parts or pleural lamellæ not developed.

Pleopoda rudimentary; first four pairs single-branched, simple, last pair wanting. Uropoda wanting.

Male with all the segments of the thorax distinct. Segments of the abdomen fused in the middle, but more or less defined at the sides.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS BOPYRINA.

a. Segments of the abdomen in female defined only on one side of the body. *Bopyrina abbreviata* Richardson

a′. Segments of the abdomen in female distinctly defined on both sides of the abdomen.

- *b*. First incubatory lamellæ with the distal segment produced in a linguiform lobe at the outer posterior extremity .... *Bopyrina urocaridis* Richardson
- *b′*. First incubatory lamellæ with the distal segment roundly produced at the inner posterior extremity .... *Bopyrina thorii* Richardson

BOPYRINA ABBREVIATA Richardson.

Bopyrina abbreviata Richardson, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 71-73.

Locality.—Puntarasa, Florida, on *Hippolyte zostericola* (Smith).

Body of adult female very asymmetrical, one side being very much longer than the other. Color entirely white with a few black dots scattered irregularly over the dorsal surface.

Head large, turned to the shorter side; frontal border produced in a rounded lobe in the middle. Antero-lateral angles produced in narrow lobes or processes. Eyes small, distinct.

The segments of the thorax are distinctly defined. The epimera on the longer side of the body are distinct on the first three segments, where they occupy the anterior portion of the lateral margin, but it is impossible to distinguish them on the shorter side. Ovarian bosses are not present on any of the segments. The epimera

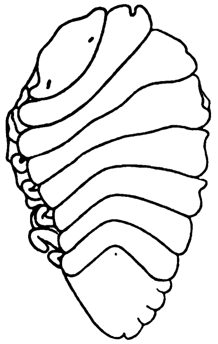

Fig. 620.—Bopyrina abbreviata. Dorsal view of female. × 23.

of the last four segments are not separated off from the segments; they occupy the entire lateral margin.

The abdominal segments are completely fused in the middle of the abdomen. On the lateral margin of the shorter side of the body there is no indication whatever of the coalesced segments. The first four abdominal segments are represented on the longer side of the body by four rounded lobes. The last two segments are completely fused, and are not indicated on either side.

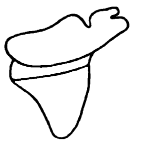

FIG. 621.—BOPYRINA ABBREVIATA. FIRST LAMELLA OF MARSUPIUM. × 27.

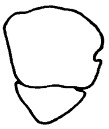

FIG. 622.—BOPYRINA ABBREVIATA. MAXILLIPED. × 41.

The pleopoda, as far as could be discerned, consist of four pairs of single branched lamellæ. Three pairs were distinctly seen; the last pair are very indistinct.

The first lamella of the marsupium on the shorter side extends about one-third the length of the body; on the longer side, the first lamella extends to the posterior margin of the second thoracic segment.

Male with head large, rounded in front. Eyes large, irregularly shaped. All seven segments of the thorax distinct. Abdomen narrower than the thorax, and tapering to a narrow extremity. In one specimen all six segments were more or less defined at the sides; in the other specimen only the first three. Length of abdomen about equal to one-third the length of the body.

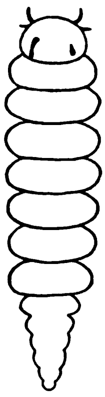

FIG. 623.—BOPYRINA ABBREVIATA. MALE. × 77½.

Color white with markings of black or brown.

Nine specimens were collected by Mr. Henry Hemphill at Puntarasa, Florida, on *Hippolyte zostericola* (Smith).

This species differs from *Bopyrina virbii* (Waltz),[a] in the much smaller first lamellæ in the female, the lamella of the shorter side of the marsupium extending but one-third the length of the body, while in *B. virbii* it extends nearly to the abdomen, that of the longer side reaching only the posterior margin of the second thoracic segment, while in *B. virbii* it extends to the posterior margin of the fourth segment; in not having any indication of segmentation on the shorter side of the abdomen, while in *B. virbii* there is some indication, and in having the abdomen of the male rounded posteriorly with indications of segmentation at the sides more or less during its entire length, while in *B. virbii* the abdomen is truncate posteriorly, with only the first two segments indicated.

The specific name refers to the abbreviated first lamellæ of the marsupium.

Type.—Cat. No. 29097, U.S.N.M.

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[a] Kossman, Zeits. f. Wiss. Zool., XXXV, 1881, p. 666–679, pls. xxxiv–xxxv.

BOPYRINA UROCARIDIS Richardson.

Bopyrina urocaridis RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 73.

Localities.—Puntarasa, Florida and west Florida, on *Urocaris longicaudata* Stimpson.

Body of female twice as long as wide.

Head with frontal margin produced in a broadly rounded process. Eyes present about the middle of the head as small black spots.

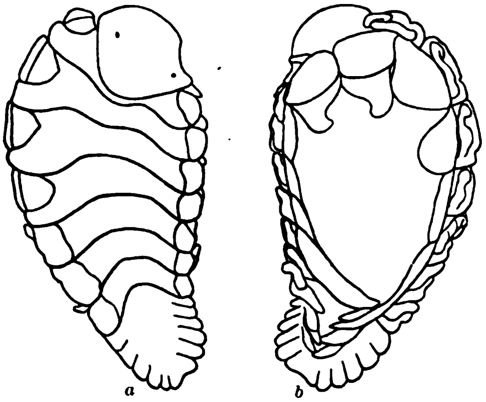

FIG. 624.—BOPYRINA UROCARIDIS. *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF SAME. × 23.

The segments of the thorax are distinct. The epimera are marked off by faint lines or impressions. The abdomen is composed of six segments, which are distinct at the sides but fused in the middle. The posterior margin of the terminal segment is broad, with a slight median excavation.

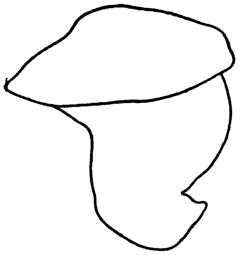

FIG. 626.—BOPYRINA UROCARIDIS. FIRST LAMELLA OF MARSUPIUM, RIGHT SIDE. × 52.

The pleopoda consist of four pairs of single-branched plates or lamellæ, each pair directed toward the median line. There are no uropoda.

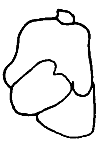

FIG. 625.—BOPYRINA UROCARIDIS. MAXILLIPED. × 39.

The incubatory pouch is a large area on the ventral side of the body, which is not closed over by the incubatory lamellæ. These lamellæ consist of five pairs of plates, the first pair of which have the second segment produced distally in a linguiform process.

Color uniformly light yellow with small black dots on the incubatory lamellæ.

Male unknown.

Four specimens were found—three at Puntarasa, Florida, collected by Henry Hemphill, and one from west Florida, collected by Mr. J. B. Henderson and Mr. C. T. Simpson, all parasitic on *Urocaris longicaudata* Stimpson.

Type.—Cat. No. 29088, U.S.N.M.

BOPYRINA THORII Richardson.

Bopyrina thorii RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 74.

Locality.—Key West, Florida, on *Thor floridanus* Kingsley.

Body of adult female asymmetrical, turned very much to one side. Color yellow, with a few markings of black on one side of the thorax and in the center of the first three segments of the abdomen.

Head large, with frontal margin produced in a rounded lobe, which is turned upward in the specimen; the antero-lateral angles are produced into small processes. The eyes are black and distinct.

The segments of the thorax are all distinctly separated from each other. The epimera are distinct on the longer side of the body as long, narrow plates on the anterior portion of the lateral margin of the first four segments. Ovarian bosses are not present on any of the segments.

The abdomen is composed of six segments, completely fused in the middle, but indicated on both lateral margins. The terminal segment is rounded posteriorly.

There are four pairs of single-branched pleopoda. The marsupium is a large, open area, normally filled with eggs, and inclosed by five pairs of lamellæ. The first lamellæ have the distal lobe rounded. The fifth lamellæ are narrow, elongated plates.

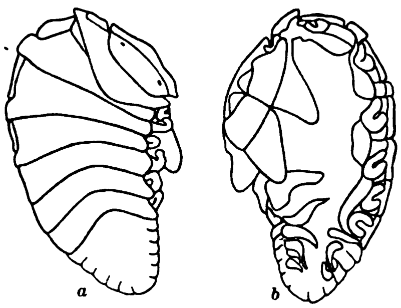

FIG. 627.—BOPYRINA THORII. *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF SAME. × 15.

Male unknown.

Only one specimen was obtained by the U. S. Bureau of Fisheries steamer *Albatross* at Key West, Florida. The species is parasitic on *Thor floridanus* Kingsley.

This species differs from the preceding species chiefly in the form of the distal segment of the first lamellæ of the marsupium.

Type.—Cat. No. 29099, U.S.N.M.

97. Genus BOPYROIDES Stimpson.[a]

Body of female broad, flattened, somewhat asymmetrical.

Abdomen distinctly segmented; lateral parts of segments or pleural lamellæ not developed.

Palp of maxillipeds well defined.

Incubatory plates widely separated, not concealing the entire incubatory cavity and not fully covering the eggs; distal segment of first pair not produced posteriorly in a lobe.

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 198.

All seven pairs of legs present. Pleopods wanting and replaced by fleshy ridges. Uropoda wanting. Male with all the segments of the thorax distinct. Segments of abdomen fused. Pleopoda wanting. Uropoda absent.

Branchial parasites.

BOPYROIDES HIPPOLYTES (Krøyer).

Bopyrus hippolytes Krøyer, Kongelige Danske Videnskabenes Selskabs naturvidenskabelige og mathematiske Afhandlinger, VII, 1838, p. 306, (78), pl. IV, fig. 22.—Edwards, Hist. Nat. des Crust., III, 1840, p. 283.—Krøyer, Kongelige Danske Videnskabenes Selskabs naturvidenskabelige og mathematiske Afhandlinger, IX, 1842, p. 262; Voy. en Scand., Crust., 1849, pl. XXVIII, fig. 2.—Stimpson, Proc. Acad. Nat. Sci., Phila., 1863, p. 140.

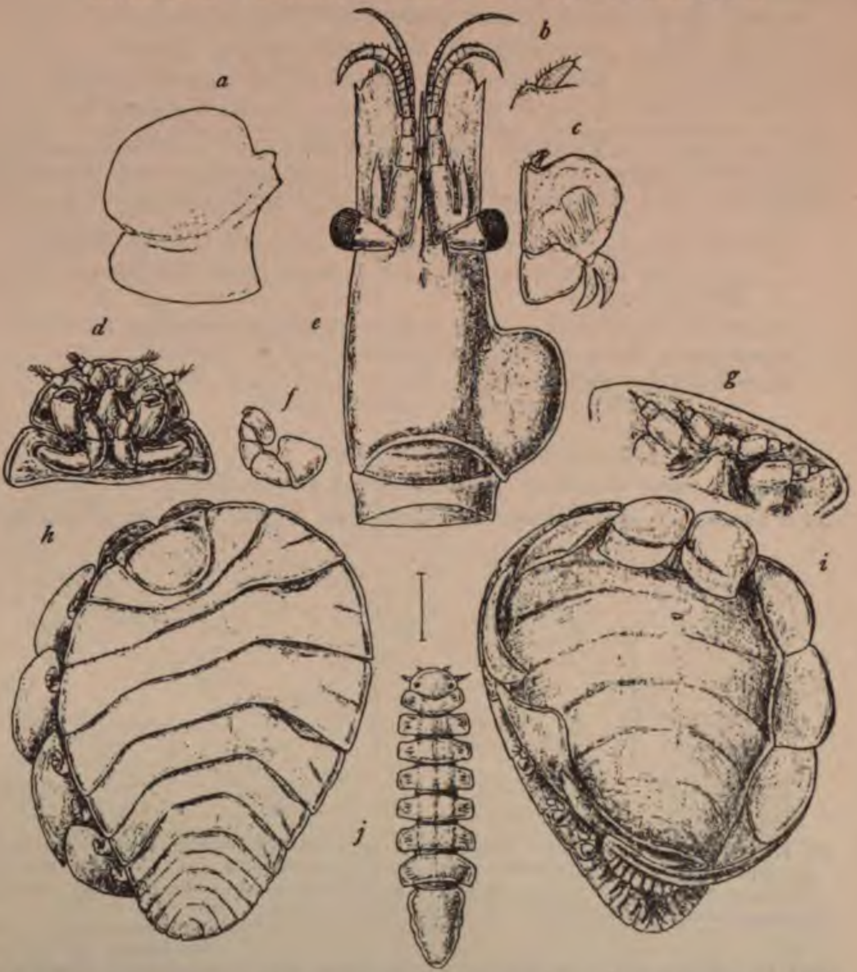

Fig. 628.—Bopyroides hippolytes (After Sars). *a*, First incubatory plate. *b*, Palp of maxilliped. *c*, Maxilliped. *d*, Head of male (ventral view). *e*, Anterior part of specimen of Spirontocaris polaris infested with this parasite. *f*, Leg. *g*, Anterior part of head of female (ventral view). *h*, Dorsal view of female. *i*, Ventral view of female. *j*, Dorsal view of male.

BOPYRINA THORII Richardson.

Bopyrina thorii Richardson, Proc. U. S. Nat. Mus., XXVII, 1904, p. 74.

Locality.—Key West, Florida, on *Thor floridanus* Kingsley.

Body of adult female asymmetrical, turned very much to one side. Color yellow, with a few markings of black on one side of the thorax and in the center of the first three segments of the abdomen.

Head large, with frontal margin produced in a rounded lobe, which is turned upward in the specimen; the antero-lateral angles are produced into small processes. The eyes are black and distinct.

The segments of the thorax are all distinctly separated from each other. The epimera are distinct on the longer side of the body as long, narrow plates on the anterior portion of the lateral margin of the first four segments. Ovarian bosses are not present on any of the segments.

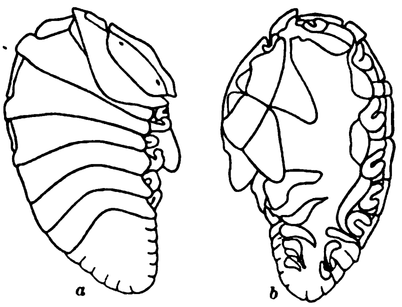

Fig. 627.—Bopyrina thorii. *a*, Dorsal view of female. *b*, Ventral view of same. × 15.

The abdomen is composed of six segments, completely fused in the middle, but indicated on both lateral margins. The terminal segment is rounded posteriorly.

There are four pairs of single-branched pleopoda. The marsupium is a large, open area, normally filled with eggs, and inclosed by five pairs of lamellæ. The first lamellæ have the distal lobe rounded. The fifth lamellæ are narrow, elongated plates.

Male unknown.

Only one specimen was obtained by the U. S. Bureau of Fisheries steamer *Albatross* at Key West, Florida. The species is parasitic on *Thor floridanus* Kingsley.

This species differs from the preceding species chiefly in the form of the distal segment of the first lamellæ of the marsupium.

Type.—Cat. No. 29099, U.S.N.M.

97. Genus BOPYROIDES Stimpson.[a]

Body of female broad, flattened, somewhat asymmetrical.

Abdomen distinctly segmented; lateral parts of segments or pleural lamellæ not developed.

Palp of maxillipeds well defined.

Incubatory plates widely separated, not concealing the entire incubatory cavity and not fully covering the eggs; distal segment of first pair not produced posteriorly in a lobe.

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 198.

All seven pairs of legs present. Pleopods wanting and replaced by fleshy ridges. Uropoda wanting. Male with all the segments of the thorax distinct. Segments of abdomen fused. Pleopoda wanting. Uropoda absent.

Branchial parasites.

BOPYROIDES HIPPOLYTES (Krøyer).

Bopyrus hippolytes Krøyer, Kongelige Danske Videnskabenes Selskabs naturvidenskabelige og mathematiske Afhandlinger, VII, 1838, p. 306, (78), pl. IV, fig. 22.—Edwards, Hist. Nat. des Crust., III, 1840, p. 283.—Krøyer, Kongelige Danske Videnskabenes Selskabs naturvidenskabelige og mathematiske Afhandlinger, IX, 1842, p. 262; Voy. en Scand., Crust., 1849, pl. XXVIII, fig. 2.—Stimpson, Proc. Acad. Nat. Sci., Phila., 1863, p. 140.

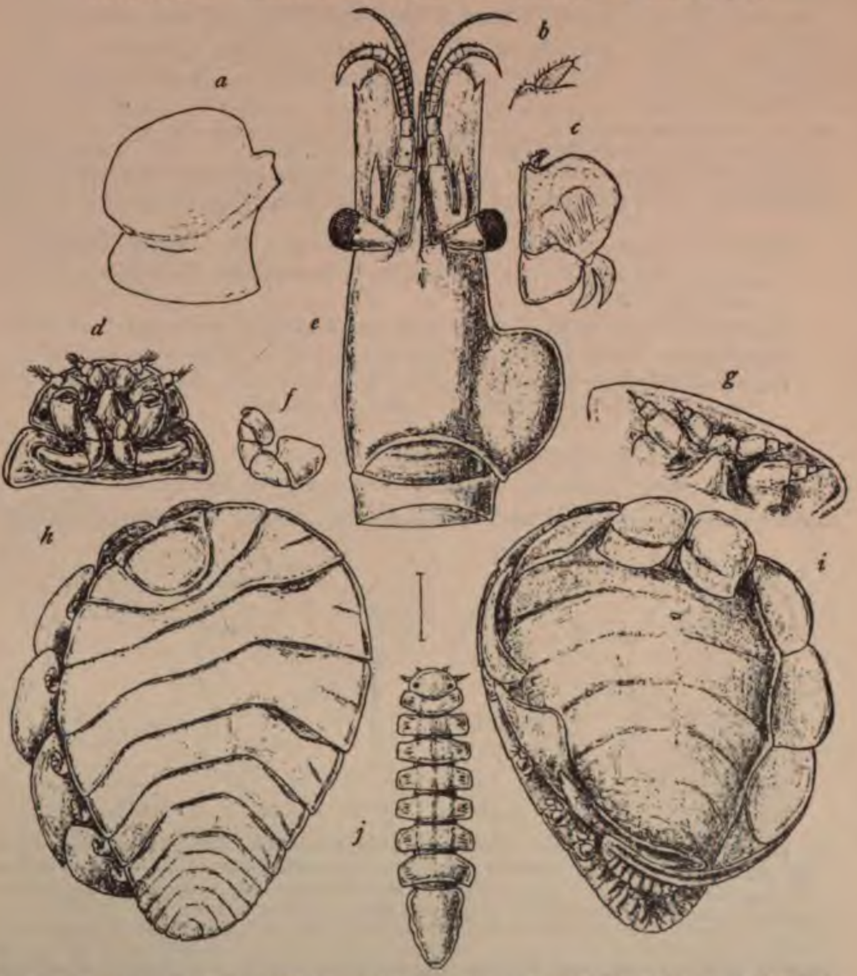

Fig. 628.—Bopyroides hippolytes (After Sars). *a*, First incubatory plate. *b*, Palp of maxilliped. *c*, Maxilliped. *d*, Head of male (ventral view). *e*, Anterior part of specimen of Spirontocaris polaris infested with this parasite. *f*, Leg. *g*, Anterior part of head of female (ventral view). *h*, Dorsal view of female. *i*, Ventral view of female. *j*, Dorsal view of male.

Bopyroides acutimarginatus STIMPSON, Proc. Acad. Nat. Sci. Phila., 1864, p. 156.

Gyge hippolytes BATE and WESTWOOD, Brit. Sess. Crust., II, 1868, p. 230.—MIERS, Ann. Mag. Nat. Hist. (4), XIX, 1877, p. 64 (14).—SMITH in HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 157.—HARGER, Rep. U. S. Fish Comm., 1880, Pt. 6, p. 311.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887-88, p. 197.—AXEL OHLIN, Akademisk Afhandling, XXII, 1895, p. 19.

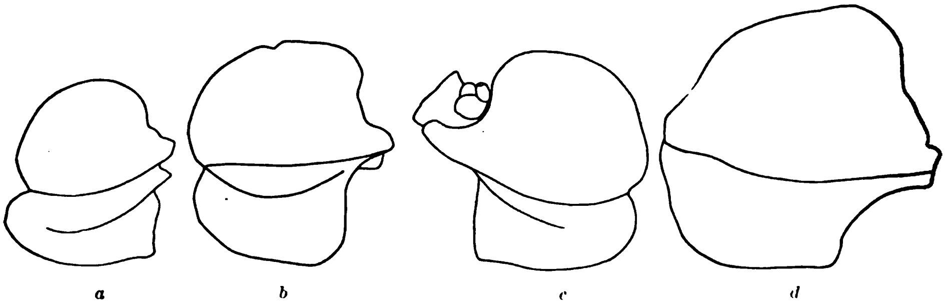

FIG. 629.—BOPYROIDES HIPPOLYTES. FIRST INCUBATORY LAMELLA OF SPECIMENS FOUND ON: *a*, SPIRONTOCARIS LAMELLICORNIA FROM PORT TOWNSEND BAY, WASHINGTON. × 11½. *b*, SPIRONTOCARIS POLARIS FROM ABERDORE CHANNEL. × 15½. *c*, SPIRONTOCARIS POLARIS FROM GRAND MENAN, NEW BRUNSWICK. × 15½. *d*, SPIRONTOCARIS SPINUS FROM OFF NORTH HEAD, AKUTAN PASS, ALASKA. × 77½.

Bopyroides hippolytes G. O. SARS, Crust. of Norway, II, 1899, pp. 199–200, pl. LXXXIV, fig. 2.—BONNIER, Travaux de la Station Zool. de Wimereux, VIII, 1900, pp. 373–375.

Bopyroides sarsi BONNIER, Travaux de la station Zool. de Wimereux, pp. 376–377.

Bopyroides sp. BONNIER, Travaux de la station Zool. de Wimereux, p. 378.

Bopyroides hippolytes RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 578; Bull. U. S. Fish Comm., XXIV, 1905, pp. 218-219.

Localities.—Circumpolar in distribution.

Atlantic coast localities: Massachusetts, Bay of Salem, on *Spirontocaris spinus*, *S. fabricii*, and *S. liljeborgii;* Casco Bay, on *S. polaris* and *S. pusiola;* Bay of Fundy, on *S. spinus* and *S. pusiola;* Halifax, Nova Scotia; Gulf of Maine, on *S. liljeborgii* and *S. spinus;* Eastport, Maine, on *S. spinus;* off Cape Cod, on *S. liljeborgii;* latitude 73° 48′ north, longitude 80° 30′ west, on *S. polaris;* latitude 72° 33′ north,

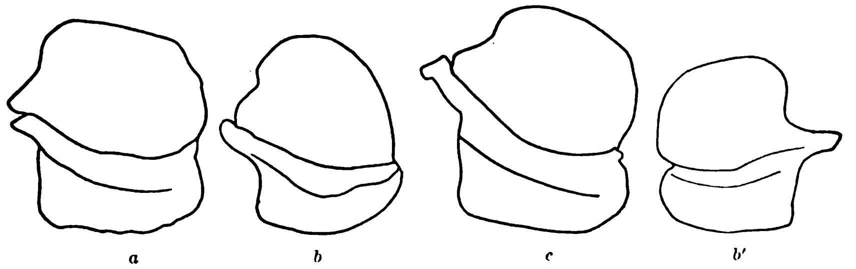

FIG. 630.—BOPYROIDES HIPPOLYTES. FIRST LAMELLA OF MARSUPIUM FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS SPINUS FROM EASTPORT, MAINE. × 14½. *b*, SPIRONTOCARIS SPINUS FROM BAY OF ISLANDS, ADAKH, ALASKA. × 23. *c*, SPIRONTOCARIS SECURIFRONS FROM THE HAWAIIAN ISLANDS. *b′*, SPIRONTOCARIS SPINUS FROM BAY OF ISLANDS, ADAKH, ALASKA. × 23.

longitude 71° 30′ west, on *S. polaris;* latitude 71° 42′ north, longitude 73° west, on *S. polaris;* latitude 66° 33′ north, longitude 61° 50′ west, on *S. polaris;* latitude 64° 56′ north, longitude 66° 18′ west, on *S. polaris.*

Pacific coast localities: Straits of Fuca, between Washington and Vancouver Island, on *Spirontocaris suckleyi;* Heceta Bank, Oregon, on *S. bispinosa;* off North Head, Akutan Island, Alaska, on *S. spinus;* Bay of Islands, Adakh, on *S. spinus;* Port Etches, Alaska, on *S. arcuata;* west of Amaknak Island, Unalaska, on *S. arcuata;* Bering Sea, north of Umnak Island, on *Pandalus borealis* Krøyer; off south entrance to Akutan Pass, Alaska, on *Pandalus montagui* Leach; between Bird and Nagai islands, Shumagins, Alaska, on *P. montagui;* Bering Sea, south of Pribilof Islands, on *P. borealis* Krøyer; Straits of Fuca, on *Pandalopsis dispar* Rathbun; Unalaska, and Lituya Bay, Alaska, on *Spirontocaris brevirostris* (Dana); Puget Sound, on *S. brevirostris;* Bering Sea, west of Pribilof

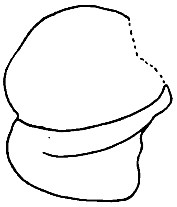

FIG. 631.—BOPYROIDES HIPPOLYTES. FIRST INCUBATORY LAMELLA FROM SPECIMEN FOUND ON SPIRONTOCARIS LILLJEBORGII FROM EASTERN FISHING BANKS (GLOUCESTER FISHERMEN). × 15½.

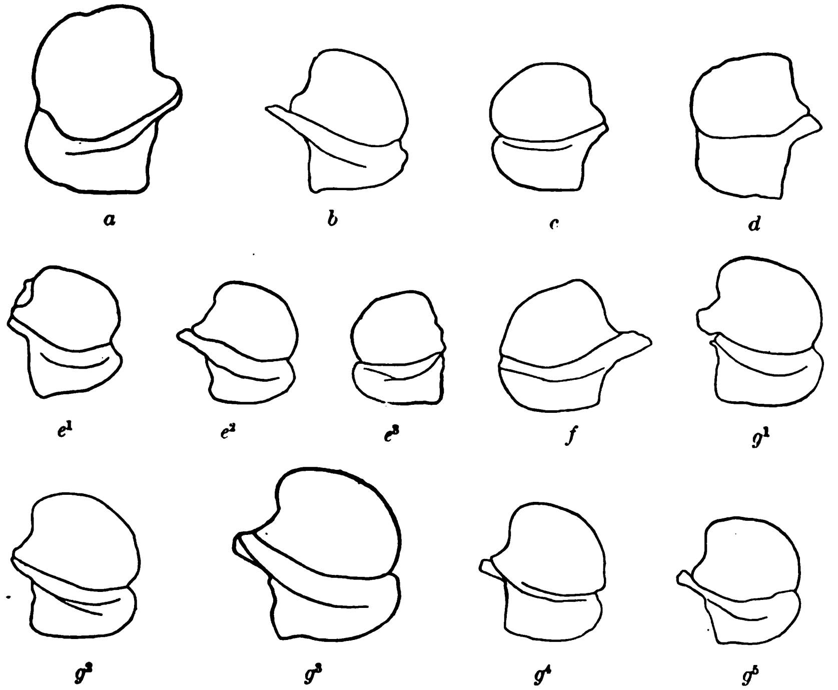

FIG. 632.—BOPYROIDES HIPPOLYTES. FIRST INCUBATORY LAMELLA FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS POLARIS FROM WEST OF PRIBILOF ISLANDS. × 14½. *b*, ON SPIRONTOCARIS SUCKLEYI FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 5. *c*, ON SPIRONTOCARIS SUCKLEYI FROM AFOGNAK BAY, AFOGNAK ISLAND. × 11½. *d*, ON SPIRONTOCARIS SUCKLEYI FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 11½. e^1, e^2, e^3, ON SPIRONTOCARIS SUCKLEYI FROM ALITAK BAY, KADIAK ISLAND. *f*, ON SPIRONTOCARIS HERDMANI FROM QUEEN CHARLOTTE SOUND, OFF FORT RUPERT, VANCOUVER ISLAND, BRITISH COLUMBIA. × 31. g^1, g^2, g^3, g^4, g^5, ON PANDALUS JORDANI FROM QUEEN CHARLOTTE SOUND, OFF FORT RUPERT, VANCOUVER ISLAND, BRITISH COLUMBIA.

Islands, on *S. polaris* (Sabine); Straits of Fuca, on *S. suckleyi;* Lituya Bay, Alaska, on *S. suckleyi;* Gulf of Georgia, off Nanaimo, Vancouver Island, British Columbia; Queen Charlotte Sound, off Fort Rupert, Vancouver Island, British Columbia, on *Spirontocaris herdmani* Walker; Queen Charlotte Sound, off Fort Rupert, Vancouver Island, British Columbia, on *Pandalus jordani* Rathbun; Admiralty Inlet, vicinity of Port Townsend, on *Spirontocaris suckleyi* (Stimpson); Afognak Bay, Afognak Island, Central Alaska, on *Spirontocaris suckleyi* (Stimpson); Alitak Bay, Kadiak Island, Central Alaska, on *Spirontocaris suckleyi* (Stimpson); Julienehaab, on *Spirontocaris fabricii* Krøyer; Sukkertoppen on *Spirontocaris spinus;* latitude 66° 32′ north, longitude 55° 34′ west, on *Spirontocaris spinus;* Ikertokfjord, on *Spirontocaris polaris;* Claushavn, on *Spirontocaris polaris;* Jakobshavn; Upernivik, on *Spirontocaris polaris;* Port Foulke or latitude 78° 17′ north; Grinnell Land, Discovery Bay, or latitude 81° 44′ north, on *Spirontocaris polaris.*

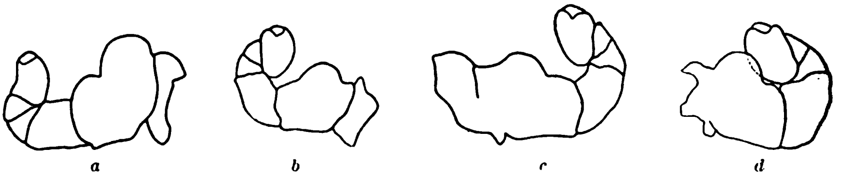

FIG. 633.—BOPYROIDES HIPPOLYTES. SIXTH LEG FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS POLARIS FROM ABERDORE CHANNEL. × 27¼. *b*, SPIRONTOCARIS SPINUS FROM NORTH HEAD, AKUTAN ISLAND, ALASKA. × 51⅗. *c*, SPIRONTOCARIS SPINUS FROM BAY OF ISLANDS, ADAKH, ALASKA. × 51⅗. *d*, SPIRONTOCARIS SPINUS FROM BAY OF ISLANDS, ADAKH, ALASKA. × 51⅗.

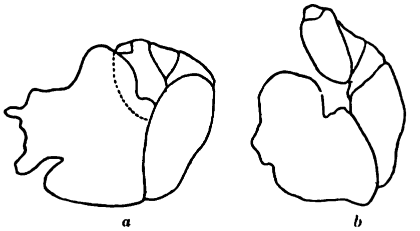

FIG. 634.—BOPYROIDES HIPPOLYTES. SIXTH LEG FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS SPINUS FROM EASTPORT, MAINE. × 39. *b*, SPIRONTOCARIS SECURIFRONS FROM BETWEEN HONOLULU AND KAUAI ISLAND, HAWAIIAN ISLANDS. × 39.

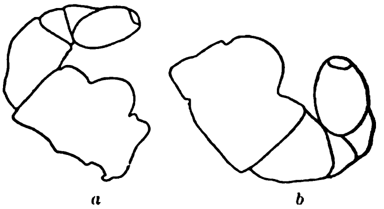

FIG. 635.—BOPYROIDES HYPPOLYTES. SIXTH LEG OF SPECIMENS FOUND ON: *a*, SPIRONTOCARIS POLARIS FROM GRAND MENAN, NEW BRUNSWICK. × 39. *b*, SPIRONTOCARIS LAMELLICORNIA FROM PORT TOWNSEND. × 39.

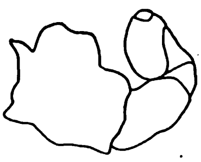

FIG. 636.—BOPYROIDES HIPPOLYTES. SIXTH LEG FROM SPECIMEN FOUND ON SPIRONTOCARIS LILLJEBORGII FROM EASTERN FISHING BANKS (GLOUCESTER FISHERMEN). × 15¼.

Also recorded from Greenland, Barents Sea, British Isles, coast of Norway; depth, 5 to 116 fathoms.

B. acutimarginatus Stimpson is undoubtedly identical with *B. hippolytes* (Krøyer), which is circumpolar in distribution, and infests the species and genera quoted above common to both coasts of North America.

Depth.—5 to 70 fathoms.

Body of female oval, somewhat asymmetrical. Length, 8 mm. Width, 7 mm.

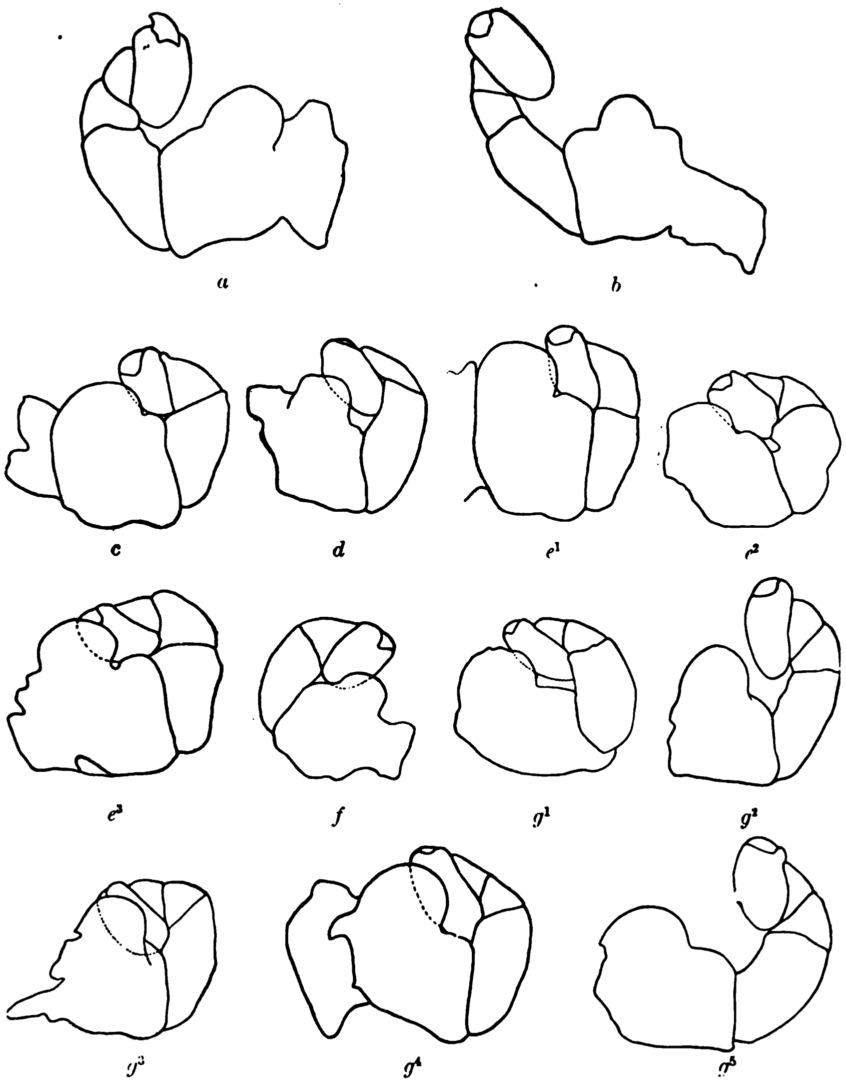

FIG. 637.—BOPYROIDES HIPPOLYTES. SIXTH LEG OF SPECIMENS FOUND ON: *a*, SPIRONTOCARIS POLARIS FROM WEST OF PRIBILOF ISLAND. × 52. *b*, ON SPIRONTOCARIS SUCKLEYI FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 41. *c*, ON SPIRONTOCARIS SUCKLEYI FROM AFOGNAK BAY, AFOGNAK ISLAND. × 52. *d*, ON SPIRONTOCARIS SUCKLEYI FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 52. e^1, e^2, e^3, ON SPIRONTOCARIS SUCKLEYI FROM ALITAK BAY, KADIAK ISLAND. *f*, ON SPIRONTOCARIS HERDMANI FROM QUEEN CHARLOTTE ISLAND, OFF FORT RUPERT, VANCOUVER ISLAND, BRITISH COLUMBIA. × 77½. g^1, g^2, g^3, g^4, g^5, ON PANDALUS JORDANI FROM QUEEN CHARLOTTE ISLAND, OFF FORT RUPERT, VANCOUVER ISLAND, BRITISH COLUMBIA.

Head a little wider than long, 2 mm.: 2½ mm., with the anterior margin of the frontal border almost straight. The posterior margin is rounded. The frontal border extends laterally on either side of the head in a small lobe. Eyes absent. The first pair of antennæ are composed of "three" articles. The second pair are composed of "five" articles. Both pairs are small and inconspicuous in a dorsal view.

The seven segments of the thorax are distinct. Ovarian bosses are present on the sub-lateral anterior portion of the lateral margins of the first four segments. The epimera of these segments are very narrow plates, lateral to the ovarian bosses. On the last three segments the epimera are narrow plates occupying the anterior portion of the lateral margin.

All six segments of the abdomen are distinct. The lateral parts of these segments are not produced. The lateral margins are straight. The sixth or terminal segment is very small and posteriorly truncate. There are no uropoda. The pleopoda are represented by fleshy ridges.

There are five pairs of incubatory lamellæ. The distal portion of the first pair has the posterior margin not produced in a lobe.

The seven pairs of legs are small, with prehensile hands and the basis furnished with a high, more or less rounded, carina.

The male is elongate, 3 mm. long and 1 mm. wide. Head with the anterior margin rounded. Eyes distinct. The first pair of antennæ are composed of three articles. The second pair are composed of four articles. All the thoracic segments are distinct, with straight lateral margins. The legs are prehensile. All the segments of the abdomen are coalesced in a single segment which tapers posteriorly to a point. There are no uropoda or pleopoda.

Family XXI. DAJIDÆ.[a]

Body of female symmetrical. Segmentation, when present, only visible in the middle of the dorsal surface.

Palp of maxillipeds wanting.

Incubatory plates small, often reduced in number. Incubatory pouch confined to the lateral parts of the body, one cavity on either side.

Only four or five pairs of legs present, crowded around the oral area.

Pleopoda usually rudimentary or entirely wanting.

Uropoda developed or absent.

Male with the first thorasic segment coalesced with the head.

Parasitic on Schizopoda.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY DAJIDÆ.

a. Body of female distinctly segmented in the dorsal region. Uropoda present. First pair of pleopods well developed; following pairs rudimentary. Genus *Dajus* Krøyer

a′. Body of female without any trace of segmentation. Uropoda absent. Pleopoda wanting.................................Genus *Holophryxus* Richardson

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[a] See G. O. Sars for characters of family, Crust. of Norway, II, 1899, p. 221.

98. Genus DAJUS Krøyer.[a]

Female with the head distinct. Middle part of dorsal surface of thorax distinctly segmented.

Abdomen abruptly narrower than the thorax; all six segments distinct.

Uropoda present in the form of two simple lamellæ, close together.

Five pairs of incubatory plates present.

Five pairs of legs present, short and thick, and of similar structure.

First pair of pleopods well developed, consisting of a pair of simple large lamellæ, placed behind the last pair of incubatory plates; following pairs of pleopoda rudimentary.

Male with the segments of the abdomen not distinct. Pleopoda wanting. Uropoda rudimentary, in the form of two small, almost inconspicuous lobes.

DAJUS MYSIDIS Krøyer.

Dajus mysidis Krøyer, Voy. en Scand. Crust., 1849, pl. xxviii, fig. 1.

Bopyrus mysidium Packard, Mem. Bost. Soc. Nat. Hist., I, 1867, p. 295, pl. viii, fig. 3.

Leptophryxus mysidis Buchholz, Zweite Deutsche Nordpolfahrt, 1874, p. 288, pl. ii, fig. 2.

Dajus mysidis Lutken, Crustacea of Greenland, 1875, p. 150.—G. O. Sars, Arch. Math. Nat., II, 1877, p. 354 (254).—Smith in Harger, Proc. U. S. Nat. Mus., II, 1879, p. 158.—Harger, Report U. S. Comm. of Fish and Fisheries, 1880, Pt. 6, p. 312.—Hansen, Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 197–198.—Sars, Crust. of Norway, II, 1899, pp. 223–224, pls. xciii, xciv.—Axel Ohlin, Bihang till k. Sv. Vet.-Akad. Handl., XXVI, Afd. iv, No. 12, 1901, p. 39.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 579.

Localities.—Labrador; Greenland; Kingigtok; Duck Island; Murchison Sound; Claushavn; latitude 73° 48′ north, longitude 80° 30′ west; latitude 72° 33′ north, longitude 71° 30′ west; latitude 71° 57′ north, longitude 73° 56′ west; latitude 66° 33′ north, longitude 61° 50′ west; latitude 64° 56′ north, longitude 66° 18′ west; west coast of Norway; Kara Sea; Sabine Island; Spitzberg; Jan Mayen; Murman coast.

Depth.—Three to 20 fathoms.

Parasitic on *Mysis oculata* (O. Fabricius).

"Body of fully grown female oval quadrangular in outline, broadest in front and slightly narrowed behind. Cephalon imperfectly defined and curved downward, frontal margin straight. Lateral parts of mesosome greatly swollen and projecting anteriorly in the form of bluntly rounded protuberances extending beyond the limits of the cephalon, median part subdepressed and exhibiting 5 or 6 distinct

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 222.

Bopyroides acutimarginatus STIMPSON, Proc. Acad. Nat. Sci. Phila., 1864, p. 156.

Gyge hippolytes BATE and WESTWOOD, Brit. Sess. Crust., II, 1868, p. 230.—MIERS, Ann. Mag. Nat. Hist. (4), XIX, 1877, p. 64 (14).—SMITH in HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 157.—HARGER, Rep. U. S. Fish Comm., 1880, Pt. 6, p. 311.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 197.—AXEL OHLIN, Akademisk Afhandling, XXII, 1895, p. 19.

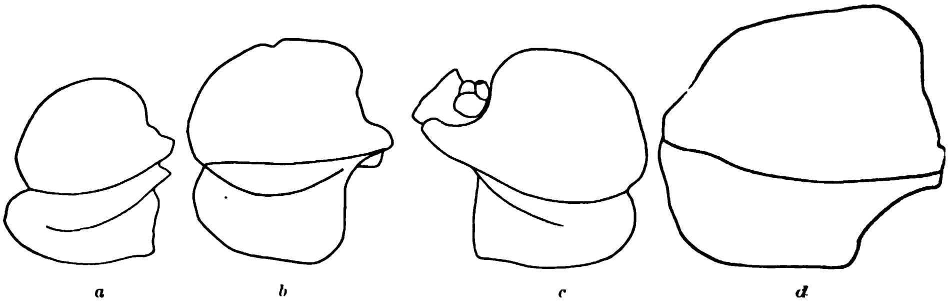

FIG. 629.—BOPYROIDES HIPPOLYTES. FIRST INCUBATORY LAMELLA OF SPECIMENS FOUND ON: *a*, SPIRONTOCARIS LAMELLICORNIA FROM PORT TOWNSEND BAY, WASHINGTON. × 11¼. *b*, SPIRONTOCARIS POLARIS FROM ABERDORE CHANNEL. × 15½. *c*, SPIRONTOCARIS POLARIS FROM GRAND MENAN, NEW BRUNSWICK. × 15½. *d*, SPIRONTOCARIS SPINUS FROM OFF NORTH HEAD, AKUTAN PASS, ALASKA. × 77½.

Bopyroides hippolytes G. O. SARS, Crust. of Norway, II, 1899, pp. 199–200, pl. LXXXIV, fig. 2.—BONNIER, Travaux de la Station Zool. de Wimereux, VIII, 1900, pp. 373–375.

Bopyroides sarsi BONNIER, Travaux de la station Zool. de Wimereux, pp. 376–377.

Bopyroides sp. BONNIER, Travaux de la station Zool. de Wimereux, p. 378.

Bopyroides hippolytes RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 578; Bull. U. S. Fish Comm., XXIV, 1905, pp. 218–219.

Localities.—Circumpolar in distribution.

Atlantic coast localities: Massachusetts, Bay of Salem, on *Spirontocaris spinus*, *S. fabricii*, and *S. liljeborgii*; Casco Bay, on *S. polaris* and *S. pusiola*; Bay of Fundy, on *S. spinus* and *S. pusiola*; Halifax, Nova Scotia; Gulf of Maine, on *S. liljeborgii* and *S. spinus*; Eastport, Maine, on *S. spinus*; off Cape Cod, on *S. liljeborgii*; latitude 73° 48′ north, longitude 80° 30′ west, on *S. polaris*; latitude 72° 33′ north,

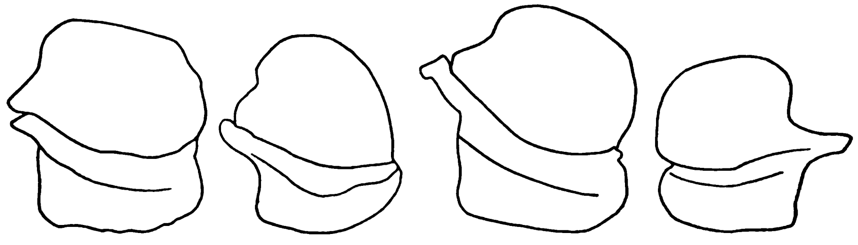

FIG. 630.—BOPYROIDES HIPPOLYTES. FIRST LAMELLA OF MARSUPIUM FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS SPINUS FROM EASTPORT, MAINE. × 14½. *b*, SPIRONTOCARIS SPINUS FROM BAY OF ISLANDS, ADAKH, ALASKA. × 23. *c*, SPIRONTOCARIS SECURIFRONS FROM THE HAWAIIAN ISLANDS. *b′*, SPIRONTOCARIS SPINUS FROM BAY OF ISLANDS, ADAKH, ALASKA. × 23.

longitude 71° 30′ west, on *S. polaris;* latitude 71° 42′ north, longitude 73° west, on *S. polaris;* latitude 66° 33′ north, longitude 61° 50′ west, on *S. polaris;* latitude 64° 56′ north, longitude 66° 18′ west, on *S. polaris.*

Pacific coast localities: Straits of Fuca, between Washington and Vancouver Island, on *Spirontocaris suckleyi;* Heceta Bank, Oregon, on *S. bispinosa;* off North Head, Akutan Island, Alaska, on *S. spinus;* Bay of Islands, Adakh, on *S. spinus;* Port Etches, Alaska, on *S. arcuata;* west of Amaknak Island, Unalaska, on *S. arcuata;* Bering Sea, north of Umnak Island, on *Pandalus borealis* Krøyer; off south entrance to Akutan Pass, Alaska, on *Pandalus montagui* Leach; between Bird and Nagai islands, Shumagins, Alaska, on *P. montagui;* Bering Sea, south of Pribilof Islands, on *P. borealis* Krøyer; Straits of Fuca, on *Pandalopsis dispar* Rathbun; Unalaska, and Lituya Bay, Alaska, on *Spirontocaris brevirostris* (Dana); Puget Sound, on *S. brevirostris;* Bering Sea, west of Pribilof

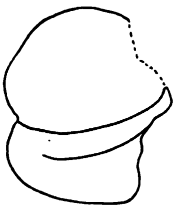

FIG. 631.—BOPYROIDES HIPPOLYTES. FIRST INCUBATORY LAMELLA FROM SPECIMEN FOUND ON SPIRONTOCARIS LILLJEBORGII FROM EASTERN FISHING BANKS (GLOUCESTER FISHERMEN). × 15½.

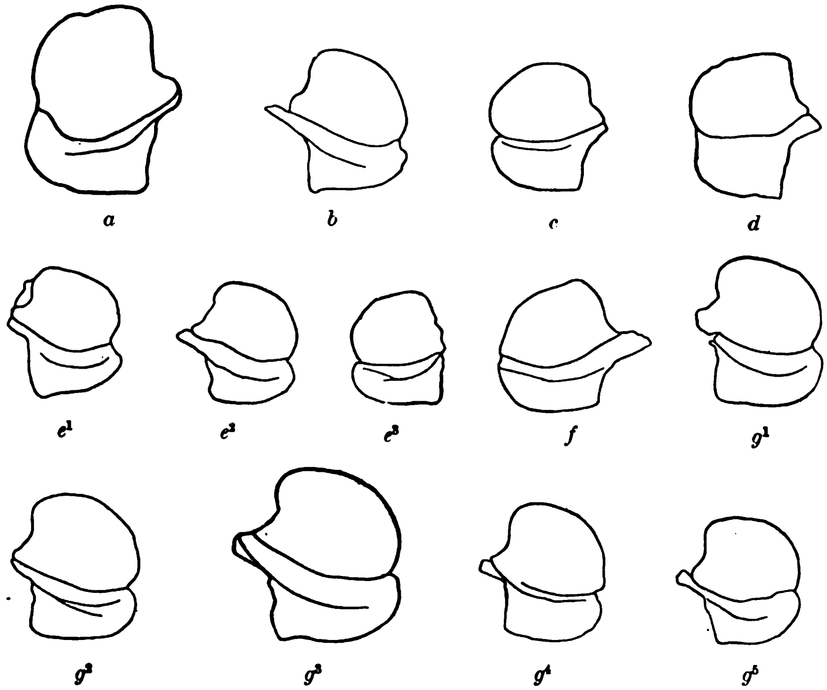

FIG. 632.—BOPYROIDES HIPPOLYTES. FIRST INCUBATORY LAMELLA FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS POLARIS FROM WEST OF PRIBILOF ISLANDS. × 14½. *b*, ON SPIRONTOCARIS SUCKLEYI FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 5. *c*, ON SPIRONTOCARIS SUCKLEYI FROM AFOGNAK BAY, AFOGNAK ISLAND. × 11½. *d*, ON SPIRONTOCARIS SUCKLEYI FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 11½. e^1, e^2, e^3, ON SPIRONTOCARIS SUCKLEYI FROM ALITAK BAY, KADIAK ISLAND. *f*, ON SPIRONTOCARIS HERDMANI FROM QUEEN CHARLOTTE SOUND, OFF FORT RUPERT, VANCOUVER ISLAND, BRITISH COLUMBIA. × 31. g^1, g^2, g^3, g^4, g^5, ON PANDALUS JORDANI FROM QUEEN CHARLOTTE SOUND, OFF FORT RUPERT, VANCOUVER ISLAND, BRITISH COLUMBIA.

Islands, on *S. polaris* (Sabine); Straits of Fuca, on *S. suckleyi;* Lituya Bay, Alaska, on *S. suckleyi;* Gulf of Georgia, off Nanaimo, Vancouver Island, British Columbia; Queen Charlotte Sound, off Fort Rupert, Vancouver Island, British Columbia, on *Spirontocaris herdmani* Walker; Queen Charlotte Sound, off Fort Rupert, Vancouver Island, British Columbia, on *Pandalus jordani* Rathbun; Admiralty Inlet, vicinity of Port Townsend, on *Spirontocaris suckleyi* (Stimpson): Afognak Bay, Afognak Island, Central Alaska, on *Spirontocaris suckleyi* (Stimpson); Alitak Bay, Kadiak Island, Central Alaska, on *Spirontocaris suckleyi* (Stimpson); Julienehaab, on *Spirontocaris fabricii* Krøyer; Sukkertoppen on *Spirontocaris spinus;* latitude 66° 32′ north, longitude 55° 34′ west, on *Spirontocaris spinus;* Ikertokfjord, on *Spirontocaris polaris;* Claushavn, on *Spirontocaris polaris;* Jakobshavn; Upernivik, on *Spirontocaris polaris;* Port Foulke or latitude 78° 17′ north; Grinnell Land, Discovery Bay, or latitude 81° 44′ north, on *Spirontocaris polaris.*

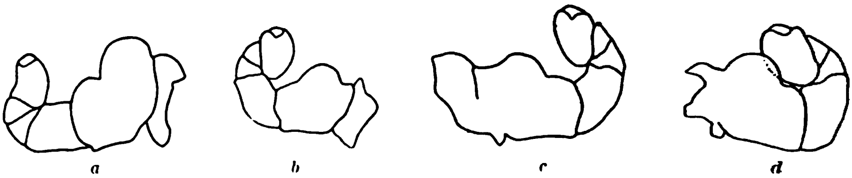

FIG. 633.—BOPYROIDES HIPPOLYTES. SIXTH LEG FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS POLARIS FROM ABERDORE CHANNEL. × 27½. *b*, SPIRONTOCARIS SPINUS FROM NORTH HEAD, AKUTAN ISLAND, ALASKA. × 51½. *c*, SPIRONTOCARIS SPINUS FROM BAY OF ISLANDS, ADAKH, ALASKA. × 51½. *d*, SPIRONTOCARIS SPINUS FROM BAY OF ISLANDS, ADAKH, ALASKA. × 51½.

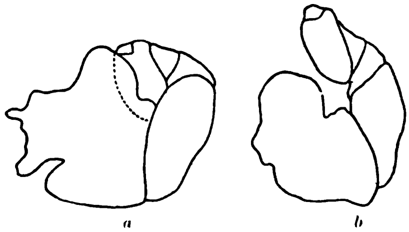

FIG. 634.—BOPYROIDES HIPPOLYTES. SIXTH LEG FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS SPINUS FROM EASTPORT, MAINE. × 39. *b*, SPIRONTOCARIS SECURIFRONS FROM BETWEEN HONOLULU AND KAUAI ISLAND, HAWAIIAN ISLANDS. × 39.

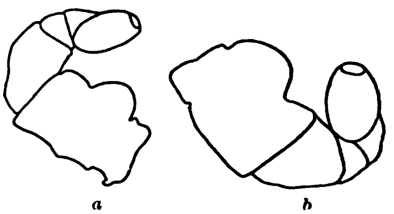

FIG. 635.—BOPYROIDES HYPPOLYTES. SIXTH LEG OF SPECIMENS FOUND ON: *a*, SPIRONTOCARIS POLARIS FROM GRAND MENAN, NEW BRUNSWICK. × 39. *b*, SPIRONTOCARIS LAMELLICORNIA FROM PORT TOWNSEND. × 39.

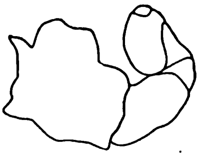

FIG. 636.—BOPYROIDES HIPPOLYTES. SIXTH LEG FROM SPECIMEN FOUND ON SPIRONTOCARIS LILLJEBORGII FROM EASTERN FISHING BANKS (GLOUCESTER FISHERMEN). × 15½.

Also recorded from Greenland, Barents Sea, British Isles, coast of Norway; depth, 5 to 116 fathoms.

B. acutimarginatus Stimpson is undoubtedly identical with *B. hippolytes* (Krøyer), which is circumpolar in distribution, and infests the species and genera quoted above common to both coasts of North America.

Depth.—5 to 70 fathoms.

Body of female oval, somewhat asymmetrical. Length, 8 mm. Width, 7 mm.

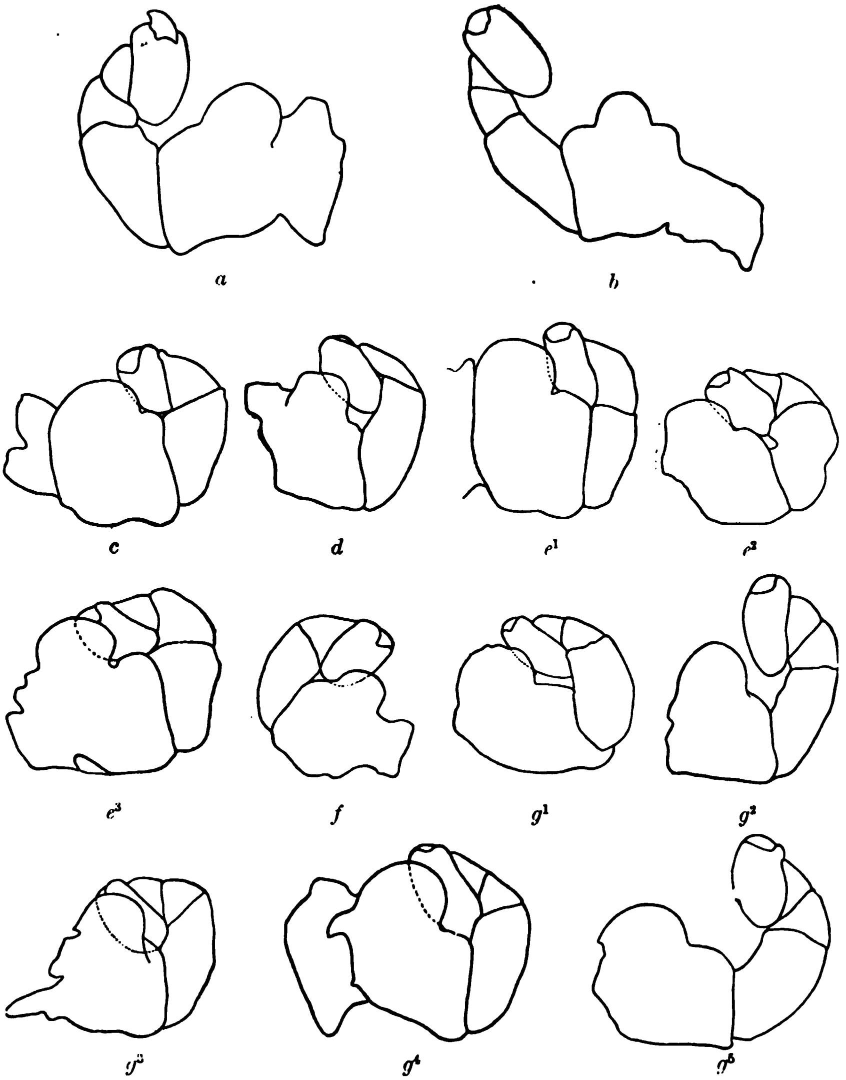

FIG. 637.—BOPYROIDES HIPPOLYTES. SIXTH LEG OF SPECIMENS FOUND ON: *a*, SPIRONTOCARIS POLARIS FROM WEST OF PRIBILOF ISLAND. × 52. *b*, ON SPIRONTOCARIS SUCKLEYI FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 41. *c*, ON SPIRONTOCARIS SUCKLEYI FROM AFOGNAK BAY, AFOGNAK ISLAND. × 52. *d*, ON SPIRONTOCARIS SUCKLEYI FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 52. e^1, e^2, e^3, ON SPIRONTOCARIS SUCKLEYI FROM ALITAK BAY, KADIAK ISLAND. *f*, ON SPIRONTOCARIS HERDMANI FROM QUEEN CHARLOTTE ISLAND, OFF FORT RUPERT, VANCOUVER ISLAND, BRITISH COLUMBIA. × 77¼. g^1, g^2, g^3, g^4, g^5, ON PANDALUS JORDANI FROM QUEEN CHARLOTTE ISLAND, OFF FORT RUPERT, VANCOUVER ISLAND, BRITISH COLUMBIA.

Head a little wider than long, 2 mm.: 2½ mm., with the anterior margin of the frontal border almost straight. The posterior margin is rounded. The frontal border extends laterally on either side of the

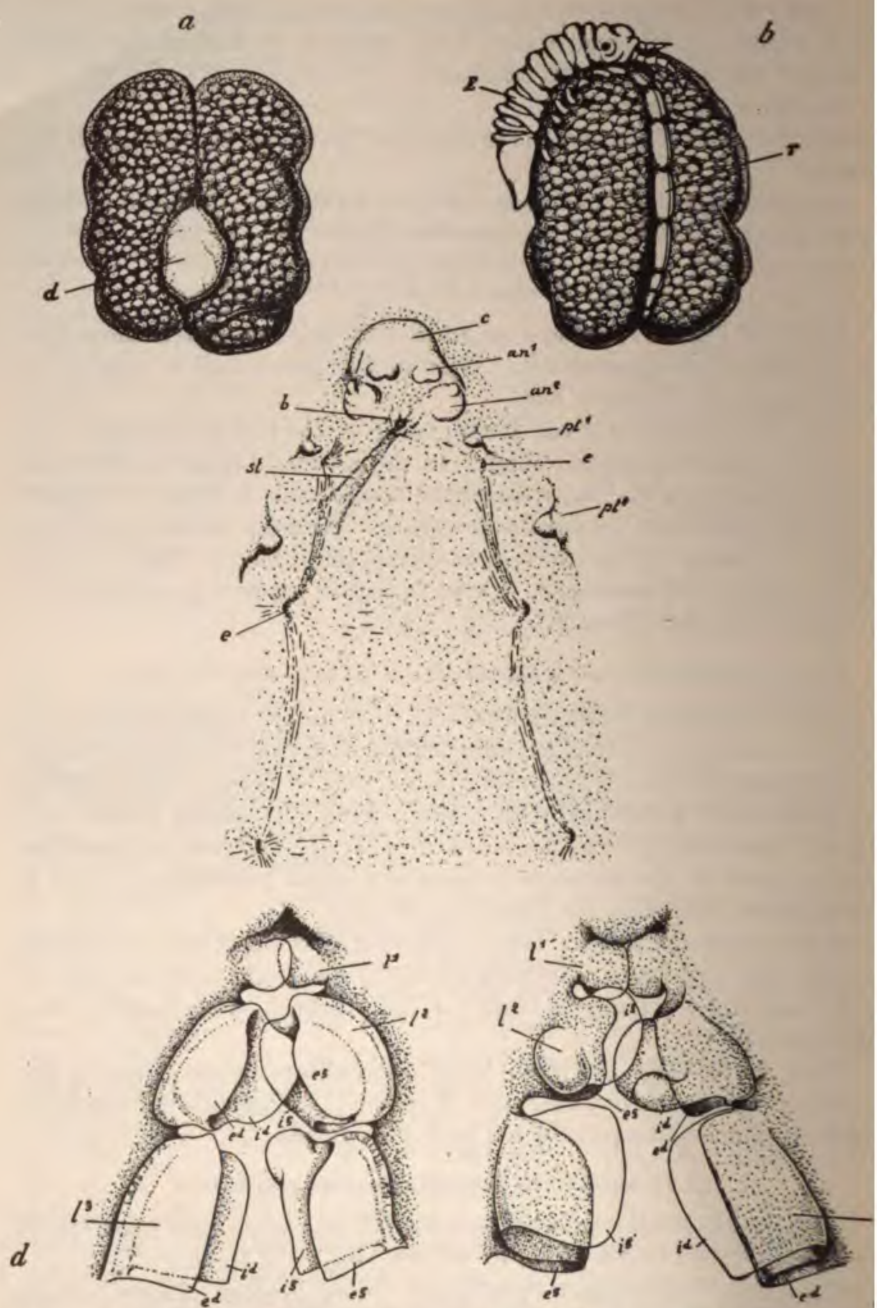

FIG. 642.—CLYPEONISCUS MEINERTI (AFTER GIARD AND BONNIER). *a*, DORSAL VIEW OF ADULT FEMALE. × 16. *b*, VENTRAL VIEW OF SAME. *c*, FEMALE AT A STAGE INTERMEDIATE BETWEEN *a* AND *b*. × 90. *d*, MODE OF OPENING OF INCUBATORY LAMELLÆ BY MARGINAL FOLDS (ADULT FEMALE). × 50. *e*, THE SAME SEEN FROM WITHIN. × 50.

Parasitic in the incubatory pouch of *Synidotea nodulosa* (Krøyer).

When the *Idotea* infested with the parasite is laid on its dorsal side and presents the ventral side to the observer, one separates the five pairs of incubatory lamellæ and perceives, on a level with the second, third, and fourth thoracic segments, a body regularly oval, slightly attenuated at the two extremities of the long axis, and presenting an appearance very indistinctly segmented; it seems completely filled with a compact mass of little grains, yellow in alcohol, which are the eggs distending the incubatory cavity. Toward the middle of the surface, which is not applied to the ventral part of the host, and a little toward the base, one notices the mark of a dead white. If one detaches this oval body and examines the other side, one sees that it is divided longitudinally by a groove, which extends from one extremity to the other. On several individuals one finds, generally toward the extremity the nearest to the head of the host, a very small Isopod, scarcely visible to the naked eye, measuring 0.85 mm., but presenting all the typical characters of the group. This last is the male *Clypeoniscus*, while the oval mass, filling the incubatory cavity of the host, is the female, reduced to a simple incubatory sac filled with embryos.

When the female becomes adult it takes the form figured, representing the dorsal and ventral sides. It is then a globular mass, which appears divided longitudinally by a groove, scarcely visible on the dorsal side and interrupted toward the cephalic region by a white mass, the dorsal organ. This little mass, somewhat thick, the histological composition of which we have not determined because of the state of preservation of the specimen, is all that remains of the visceral part of the female, the ovary, digestive tube, etc. Outside of this there is nothing more than the body wall transformed into an incubatory envelope, preserving nothing to recall the primitive Isopod, neither segmentation nor appendages. However, if one examines the female on the ventral side, considering its position in relation to the host, we see that the dorsal groove continues on this side and assumes an appearance altogether special. Immersed between the lateral masses filled with embryos, it is formed by the superposition of a system of small lamellæ which one can easily enough separate, without tearing, and which permits of emptying the female completely of eggs; it is the opening of the incubatory cavity.

We have represented this system of lamellæ as we have been able to expose it under the microscope, after having removed the dorsal surface of the female. This long opening terminates plainly in two extremities between the anterior and the posterior bosses of the animal, and the way in which the lamellæ which form it lie over each other in regular order is rather complicated. Very small at the two extremities of the opening these lamellæ become larger toward the ventral part; they are ten or eleven pairs in number.

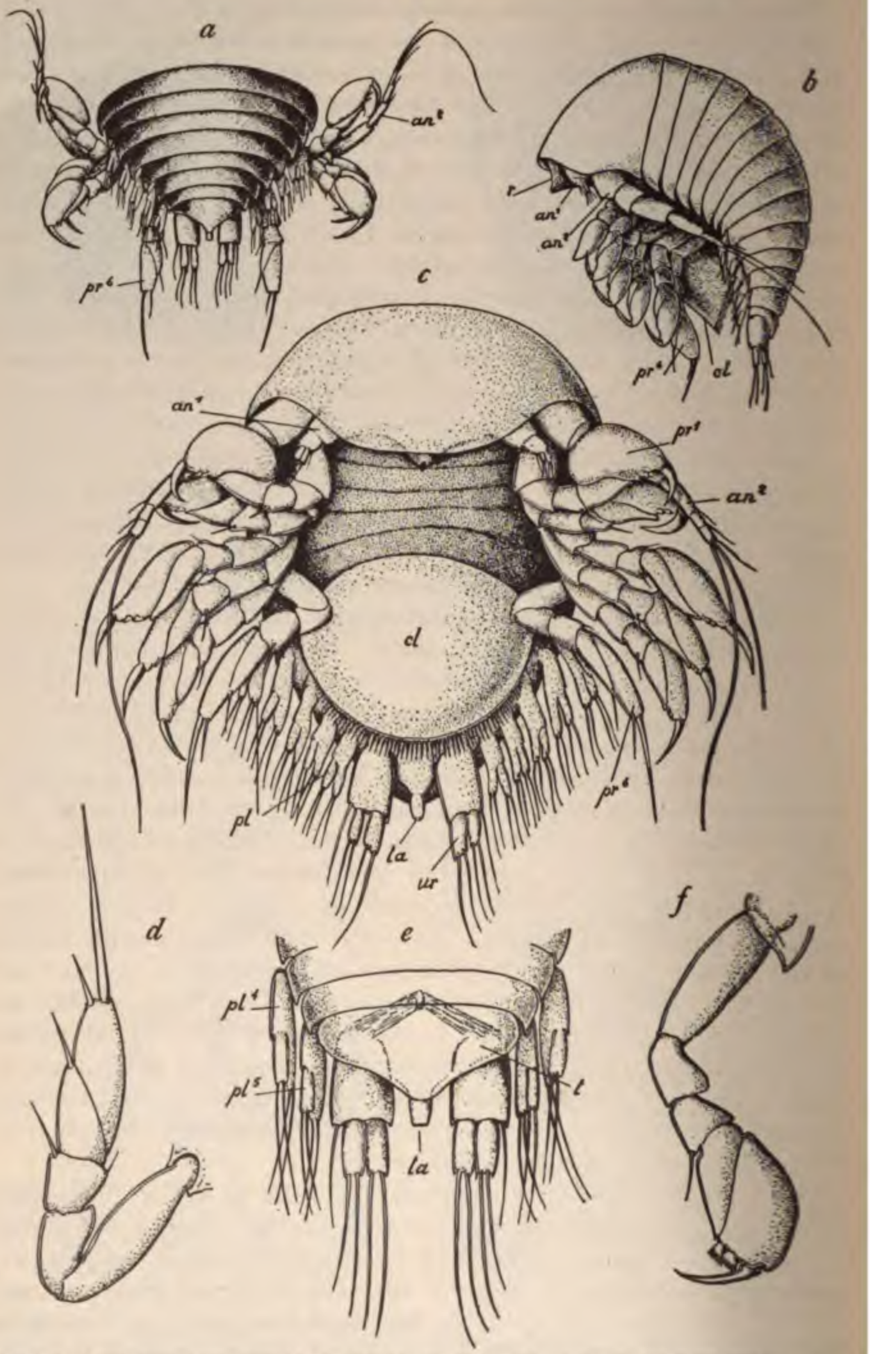

FIG. 643.—CYLPEONISCUS MEINERTI (AFTER GIARD AND BONNIER). *a*, POSTERIOR PART, VIEWED DORSALLY, OF EMBRYO OF FIRST STAGE. × 240. *b*, LATERAL VIEW OF EMBRYO. × 240. *c*, VENTRAL VIEW OF EMBRYO. × 420. *d*, SIXTH LEG. × 580. *e*, POSTERIOR EXTREMITY. × 580. *f*, FIFTH LEG. × 580.

The figures represent the anterior extremity of the opening seen from the exterior and the interior side (the observer being supposed, in the last case, to be within the incubatory cavity). The first pair of lamellæ is simple, semicircular, and one of them covers the other; but the second and third become much more complicated; each is formed of a double fold, presenting in a way two secondary lamellæ united along one of their lateral margins, while the others remain free. They arrange thus between themselves an opening similar to that formed by a sheet of paper folded in two. When the lateral margins of the fissure of the opening of the incubatory cavity are brought together, the inner secondary lamella of the right margin, for example, penetrates into the fissure arranged between the inner secondary lamella of the left side and the outer secondary lamella of the left side, which is itself covered by the external secondary lamella of the right side.

These lamellæ, very thin on their free edges, are a little thicker near their point of attachment and present several little symmetrical swellings. Each pair is separated from the other by an interval which is apparent only when one stretches the walls of the incubatory cavity. When the living female rolls up on herself, all the lamellæ are covered over, not only laterally, but also behind and before in such a way as to close hermetically the cavity where the embryos are inclosed.[a]

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[a] The above is adapted from the following description of Giard and Bonnier's:

Quand, l'Idotée parasitée étendue sur la face dorsale et présentant sa face ventrale à l'observateur, on écarte les cinq paires de lamelles incubatrices, on aperçoit au niveau des 2^e, 3^e et 4^e segments thoraciques un corps régulièrement ovoïde, légèrement atténué aux deux extrémités du grand axe et montrant une apparence très vaguement segmentée; il semble rempli exactement d'une masse compacte de petits grains, jaunâtres dans l'alcohol, qui sont des œufs distendant la cavité incubatrice. Vers le milieu de la surface qui n'est pas appliquée à la partie ventrale de l'hôte, et un peu vers le bas, on remarque une tache d'un blanc mat. Si l'on détache ce corps ovoïde et si l'on examine l'autre face, on voit qu'elle est divisée longitudinalement par un sillon qui s'étend d'une extrémité à l'autre. Sur quelques individus on trouve généralement, vers l'extrémité la plus rapprochée de la tête de l'hôte, un très petit Isopode, à peine visible à l'œil nu, mesurant 0^{mm},85, mais présentant toutes les particularités typiques du groupe: ce dernier est le mâle *Clypeoniscus*, tandis que la masse ovoïde, remplissant la cavité incubatrice de l'hôte, est la femelle réduite à un simple sac incubateur rempli d'embryons.

Quand la femelle devient adulte, elle prend la forme figurée, représentant les faces dorsale et ventrale. C'est alors une masse globuleuse qui semble divisée longitudinalement par un sillon, peu visible à la face dorsale et interrompu, vers la région céphalique, par une partie blanchâtre que nous appellerons organe dorsal. Cette petite masse, un peu épaissie, et dont nous n'avons pu déterminer la composition histologique, à cause de l'état de conservation de l'animal, est tout ce qui reste de la partie viscérale de la femelle, ovaire, tube digestif, etc. Hors cela, il n'y a plus que la paroi du corp transformée en enveloppe incubatrice, et ne conservant plus rien rappelant l'Isopode primitif, ni segmentation, ni appendices.

Cependant si on considère la femelle par la face que nous appelons ventrale, vu sa position par rapport à l'hôte, nous voyons que le sillon dorsal se continue sur cette face et prend un aspect tout à fait spécial. Enfoncé entre les masses latérales, bourrées

The young stage of the female and the male of *Clypeoniscus hanseni* is described and figured in the above article. Sars suggests that perhaps the two species are identical, the occurrence of both forms only has led the authors (Giard and Bonnier) to regard them as distinct species.

Attached to the ventral side of the abdomen of the Isopod *Pancolus californiensis* Richardson was a parasite which probably belongs to the family *Cryptoniscidæ*. As, however, there are no males and no immature forms to indicate the relationship of this parasite, I shall not indicate its systematic position at present. In case this should prove to be a new genus of *Cryptoniscidæ*, I might suggest the name *Oosaccus* for its reception.

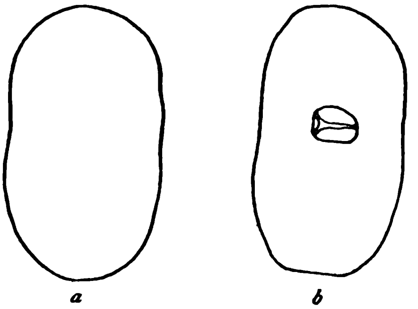

FIG. 644.—OOSACCUS. *a*, DORSAL SIDE OF FEMALE. *b*, VENTRAL SIDE OF SAME.

Body of female ovate, longer than broad, 2 mm.:3 mm.; perfectly symmetrical, with the anterior and posterior extremities rounded. There is no trace of segmentation, and there are no appendages, the body being simply an oval sac.

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d'embryons, il est formé par la superposition d'un système de petites lamelles qu'on peut assez facilement séparer, sans les déchirer, et qui permettent de vider complétement la femelle de ses embryons: c'est l'ouverture de la cavité incubatrice.

Nous avons représenté ce système de lamelles tel que nous avons pu l'étaler sous le microscope, après avoir enlevé la surface dorsale de la femelle. Cette longue fente se termine nettement aux deux extrémités entre les bosses antérieures et postérieures de l'animal, et la façon dont s'imbriquent les lamelles qui la ferment est assez compliquée. Très petites aux deux extrémités de la fente, ces lamelles deviennent plus grandes vers la partie ventrale; elles sont au nombre de dix ou onze paires.

Les figures représentent l'extrémité antérieure de la fente vue par la partie extérieure et la partie intérieure (l'observateur étant supposé, dans ce dernier cas, dans la cavité incubatrice). La première paire de lamelles est simple, semi-circulaire, et l'une d'elles recouvre l'autre; mais la deuxième et la troisième deviennent bien plus compliqués; chacune d'elles est formée d'un double repli de façon à présenter deux lamelles secondaires soudées par un de leurs bords latéraux, tandis que les autres restent libres; elles ménagent donc entre elles une fente semblable à celle formée par une feuille de papier pliée en deux. Quand les bords latéraux de la fente d'ouverture de la cavité incubatrice sont rapprochés, la lamelle secondaire interne du bord droit, par example, pénètre dans la fente ménagée entre la lamelle secondaire interne du bord gauche, et la lamelle secondaire externe du même bord, qui est elle-même recouverte par la lamelle secondaire externe du bord droit.

Ces lamelles, très minces sur leurs bords libres, sont un peu plus épaisses vers leur point d'attache et présentent quelques petits renflements symétriques. Chaque paire est séparée de l'autre par un intervalle qui n'est sensible que quand on opère une traction sur les parois de la cavité incubatrice. Quand la femelle vivante se ramasse sur elle-même, toutes les lames se recouvrent, non seulement latéralement, mais aussi d'arrière en avant, de façon à clore hermétiquement la cavité où sont incubés les embryons.—GIARD and BONNIER, Bull. scient. de la France et de la Belgique (4), 1893, pp. 422–423, 425–427.

There is no chord of attachment. On the ventral side is a small rounded opening, where the parasite was attached to the host. There seems to be an outer wall and an inner wall. The outer wall is probably attached to the host around the circular opening. The inner wall is guarded by three or four valves. Through the integument of the inner wall can be seen the eggs which completely fill the body cavity. It was found attached to the ventral side of the abdomen of the Isopod *Pancolus californiensis* Richardson, belonging to the family *Tanaidæ*. There are but two specimens, both females, and no males were found.

The types are in the U. S. Nat. Museum, Cat. No. 32111, U.S.N.M.

VI. ONISCOIDEA.[a]

Legs all ambulatory in character. Uropoda terminal, styliform, composed of a peduncle and two branches, the branches being uniarticulate. Pleopoda fitted for air breathing, the outer opercular plate of the first two pairs and sometimes of all five pairs containing air cavities or tracheæ. In the male the inner plate of the second pair and sometimes of the first pair is modified. Abdomen composed of six well-defined segments.

The first pair of antennæ are small, rudimentary, and inconspicuous; they are never composed of more than three articles.

Mandibles strong, without palps. First maxillæ have two masticatory lobes. Second maxillæ with only a very slight indication of a subdivision into lobes.

Marsupial pouch in the female composed of four pairs of plates issuing from the bases of the second, third, fourth, and fifth pairs of legs.

This superfamily includes all the terrestrial Isopods.

ANALYTICAL KEY TO THE FAMILIES OF ONISCOIDEA.

a. Inner antennæ with one to two articles. Pleopoda in four pairs; those of first segment wanting; those of the second, third, fourth, and fifth segments have a single branch, all branchial; the branch of the second segment, however, in the male, is produced on the inside in a long, compressed stylet; uropoda form an inferior operculum.................................Family XXIII. TYLIDÆ

a′. Inner antennæ with three articles. Pleopoda in five pairs, all double branched. External branch of all five pairs opercular in character. Internal branch branchial, in the male, however, of the first and second pairs sexual; uropoda not forming an operculum.

  b. First maxillæ with inner lobe furnished with from five to fifteen plumose processes.......................................Family XXIV. EUBELIDÆ

  b′. First maxillæ with the inner lobe furnished at the tip with only two or three plumose processes.

    c. Buccal mass not very prominent below. First maxillæ have two plumose setæ on the inner plate. Mandibles with molar expansion obsolete, without any triturating surface, it being replaced by brushlike recurved setæ.

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[a] For characters of family see Budde-Lund, Crustacea Isopoda Terrestria, 1885, and Sars, Crustacea of Norway, II, 1899, pp. 153–154.

d. Maxillipeds with terminal joints small and almost rudimentary, hardly longer than masticatory lobe, which is truncate.

e. External antennæ generally long, close together, with antennal openings large. Body as a rule scarcely able to be contracted in a ball. Head less manifestly immersed in first thoracic segment. Lateral parts of the head separated by a vertical marginal and inframarginal line. Clypeus arched. Legs generally long. Uropoda produced, reaching beyond the terminal segment of the abdomen and the preceding segment. Terminal segment narrower than preceding ones and usually conically produced at end .... Family XXV. ONISCIDÆ

e′. External antennæ generally short, with antennal openings small. Body able to be contracted into a ball. Head immersed in first thoracic segment. Lateral parts of the head undifferentiated. Clypeus perpendicular. Legs generally short. Uropoda short, not reaching beyond the terminal segment of the abdomen or the preceding segment. Terminal segment short and broad... Family XXVI. ARMADILLIDIDÆ

d′. Maxillipeds with terminal joints large, lamellar, much longer than masticatory lobe, which is acutely produced... Family XXVII. SCYPHACIDÆ

c′. Buccal mass prominent. First maxillæ have three plumose setæ on the inner plate. Mandibles with molar expansion large and broad, exhibiting a finely fluted triturating surface.

d. Head without any lateral lobes, frontal part rounded. Eyes well developed or wanting. Inner antennæ with last joint very small and without distinctly developed sensory filaments. Second antennæ with flagellum multiarticulate. Posterior maxillæ with two thick, hairy bristles. Maxillipeds with the terminal part distinctly five-articulate, masticatory lobe truncate at tip, epignath short. External sexual appendages in male double. Inner branches of first pair of pleopoda of a similar structure in both sexes, that of second pair in male terminating in long stylet. Both branches of uropoda styliform .... Family XXVIII. LIGYDIDÆ

d′. Head with distinct, though not very large, lateral lobes, front more or less produced. Eyes small or wanting. Inner antennæ with last joint well developed and tipped with a number of delicate sensory filaments. Second antennæ with flagellum not more than six jointed. Posterior maxillæ without any bristles. Maxillipeds with the terminal part generally imperfectly articulated, masticatory lobe terminating in a thin lash, lepignath narrow, linguiform. Sexual appendage of male simple; inner branch of both first and second pairs of pleopoda modified. Uropoda with branches conically tapered........ Family XXIX. TRICHONISCIDÆ

Family XXIII. TYLIDÆ.[a]

Inner lobe of the First maxillæ furnished with three subequal plumose processes.

First pair of antennæ small, composed of one or two articles. Abdomen composed of six distinct segments.

Four pairs of pleopoda present; the first pair of pleopoda are wanting; the pleopoda of the second, third, fourth, and fifth segments have single branches, all branchial; the branch of the second segment, however, in the male is produced on the inside in a long, compressed stylet.

The uropoda form an operculum, with the outer branch very small and situated at the apex.

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[a] See Budde-Lund for characters of family, Crustacea Isopoda Terrestria, 1885, p. 272.

101. Genus TYLOS Latreille.

With characters of family.

Only genus.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS TYLOS.

a. Terminal abdominal segment triangularly produced, with apex rounded. Ventral plates or inferior processes of the fifth abdominal segment meeting in the median ventral line. Color white.................... *Tylos niveus* Budde-Lund

a'. Terminal abdominal segment quadrangular; posterior margin straight, not produced. Ventral plates of fifth abdominal segment not meeting in the median ventral line. Color light brown with black spots.
Tylos latreilli Audouin and Savigny

TYLOS NIVEUS Budde-Lund.

Tylos niveus BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 278–279.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 561; Trans. Conn. Acad. Sci., XI, 1902, p. 301.

Localities.—Key West, Florida; Bermudas.

Body oblong-ovate, convex, contractile into a ball, very minutely and densely punctate, and covered with hairs, especially at the sides.

Eyes small, composite, occupying a fourth part of the width of the head; about 30 ocelli.

First pair of antennæ composed of one article, immovable.

Second pair lost in the specimen. Front of head not separated from the epistome; epistomal shield subtetragonal, becoming narrow anteriorly, reflexed; clypeus large, tretragonal, a little impressed transversely.

The first segment of the thorax with the lateral margin deeply sulcate; epimera of the two following segments small, rounded, subtriangular, a little excavate anteriorly.

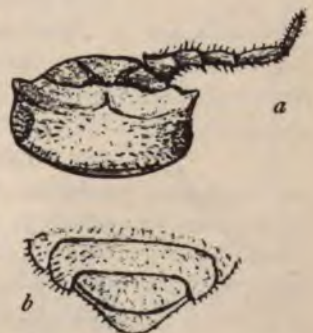

FIG. 645.—TYLOS NIVEUS (AFTER DOLLFUS). *a*, HEAD WITH ANTENNA. *b*, LAST TWO SEGMENTS OF ABDOMEN. (ENLARGED.)

The fifth segment of the abdomen with the inferior processes strong, tetragonal, meeting in the middle; the fourth segment with the processes small, oblong, narrow; the third segment with the epimera minute; the terminal segment convex, extending a little beyond the parallel epimera of the preceding segment. The uropoda form a rounded operculum, becoming narrower anteriorly.

Color white.

Length 13 mm. Width 5.5 mm. Height 3 mm.[a]

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[a] The above description is adapted from the following one of Budde-Lund's:

Oblonge ovalis, convexus, in globum contractilis, minutissime et dense punctatus, præsertim ad latera setigerus.

Oculi minores, compositi vel congregati, quartam partem capitis latitudinis possidentes, corneulæ vel ocelli circiter 30.

Antennæ exteriores ——.

TYLOS LATREILLI Audouin and Savigny.

Tylos latreilli Audouin and Savigny, Descript. de l'Égypte, 1826, pp. 285–287, pl. xiii, fig. 1.

Tylos armadillo Latreille, Cuvier, Règne Animal, 2d ed., IV, 1829, p. 142.—Guerin, Iconogr. Crust., 1829–1843, p. 35, pl. xxxvi, fig. 4.

Tylos latreilli Milne Edwards, Hist. Nat. Crust., III, 1840, p. 188; Règne anim., Crust., 1849, pl. lxx bis., fig. 2.—Lucas, Expl. d'Alg., I, 1849, p. 73.—Heller, Verh. Zool.-bot. Ver., Wien, XVI, 1866, p. 732.—Miers, Proc. Zool. Soc. Lond., 1877, p. 674.—Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 273–274 (see Budde-Lund for synonymy).—Dollfus, Bull. Soc. d'Études Scientifiques de Paris, 12th year, 1890, pl. i, fig. 4.

Tylos armadillo Dollfus, Mém. Soc. Zool. de France, 1896, p. 550.

Tylos latreilli Richardson, Trans. Conn. Acad. Sciences, XI, 1902, pp. 300–301, pl. xl, fig. 56.

Localities.—Bermudas; Miami, Florida; Long Bird Island, Bermudas; also Algeria; Tunisie; Odessa.

Body elliptical in outline, very convex, and able to be contracted in a ball. Surface smooth or minutely granular and setigerous. Color yellow or light brown, marked with black spots.

Head with front not marginate; lateral angulations produced into lobes, which are truncate. Epistome forming a triangular shield, advancing some distance beyond the surface of the head. Eyes situated post-laterally. Second pair of antennæ, with a five-jointed peduncle and a flagellum consisting of four joints, extend to the posterior margin of the second thoracic segment.

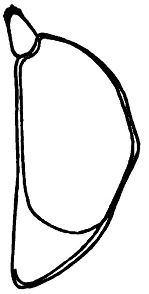
Fig. 646.—Tylos latreilli. Operculum.

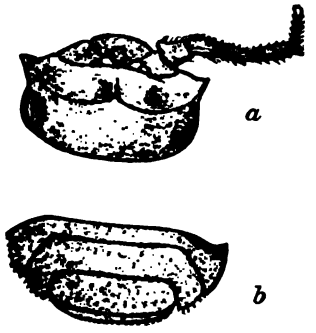

Fig. 647.—Tylos latreilli (After Dollfus). *a*, Head with antenna. *b*, Last two segments of abdomen. (Enlarged.)

The seven thoracic segments are subequal. The epimera of the first segment are represented by a thickening of the lateral edge, which is incised or cleft posteriorly. The epimera of all the other segments are dorsally separated by distinct suture lines.

Antennæ interiores uniarticulatæ, immobiles.

Frons ab epistomate non discreta; epistomatis scutellum subtetragonem, ante angustatum, reflexum; clypeus amplus, tetragonus, tranverse paulum impressus.

Trunci annulus primus margine laterali profunde sulcato; epimera annulorum duorum sequentium parva, rotundata, subtriangula, ante paulum excavata.

Caudæ annulus quintus processubus inferioribus validis; tetragonis, medio attingentibus; annulus quartus processubus parvis, oblongis, angustis; annulus tertius epimeris minutis; annulus analis convexus, epimera annuli præanalis parallela satis superans. Pedes anales operculum rotundatum, ante angustatum formantes.

Color albidus.

Longitudo 13 mm. Latitudo 5.5 mm. Altitudo 3 mm.—Budde-Lund, Crust. Isop. errestria, 1885, pp. 278–279.

The first two abdominal segments have their lateral margins covered by the seventh thoracic segment. The three following segments complete the elliptical outline of the body, their lateral margins forming a line curving inward toward the terminal segment. The last abdominal segment is quadrangular in outline, its post-lateral angles rounded, and extends a little distance beyond the epimera of the preceding segment. The uropoda are transformed into opercular valves. At the posterior end of each large lamellar valve is a small setose joint. The third, fourth, and fifth abdominal segments have plates on the ventral side extending from the margin inward in the form of lamellæ, those of the fifth segment being longest and largest, but not meeting in the median line, being a little distance apart.

The legs are simple, ambulatory.

Three specimens were collected by Mr. J. M. Jones at the Bermudas, and about twenty more by Prof. A. E. Verrill and party at the same locality in 1898. Others were collected in 1901 at Long Bird Island, Bermudas.

Family XXIV. EUBELIDÆ.[a]

Flagellum of the second antennæ generally more or less obscurely triarticulate, rarely only biarticulate; peduncle with the first article very short, the third article always shorter than the second, the fourth article a little longer than the second, the fifth article always the longest.

Eyes distinct, composed of numerous ocelli.

Head with the epistome forming a continuous frontal marginal line, often effaced in the middle. The antennal foramina are moderately large, the antennal tubercles small, often wanting. Clypeus short, vaulted, lobate at the sides. The pleuræ of the head are fused; the vertical marginal line does not reach the frontal margin; there is no vertical inframarginal line.

The inner lobe of the first or inner maxillæ has numerous plumose processes (5–15); the outer or second maxillæ are wide, obscurely bifid, the exterior lobe much wider and larger than the inner.

The first segment of the thorax has thick epimera, separated from the middle of the segment by a sutural furrow, the lateral margin posteriorly cleft, rarely entire. The anterior articulating part of all the segments (2–7) manifestly separated from the posterior part. The marsupium is present.

The terminal abdominal segment is triangularly or even quadrangularly produced, not extending or extending very little beyond the epimera of the preceding segment. The outer branch of the first or generally of all the pleopoda furnished with tracheæ. Uropoda short, not extending or extending very little beyond the terminal segment of the abdomen. Peduncle large, wide. Outer branch small or minute.

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[a] See Budde-Lund for characters of family, A revision of Crustacea Isopoda Terrestria, 1899, Pt. 1, Eubelum, pp. 2–3.

102. Genus ETHELUM Budde-Lund.[a]

Antennæ with the flagellum composed of two articles. Inner lobe of the first or inner maxillæ furnished with four plumose processes.

First segment of the thorax with the epimeron thick, separated above from the middle of the segment by a longitudinal furrow, lateral margin not excavate, posteriorly cleft. The second segment of the thorax with the epimera entire.

Outer branches of all the pleopoda furnished with tracheæ.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ETHELUM.

a. Surface of body smooth, with the side parts of the thoracic segments (two to seven) and the abdominal segments not bent downward.

  b. Prosepistoma plain. Coxopodite of the second segment of the thorax forming a nearly inconspicuous ridge before the leg. Caudal segment triangular; apex pointed. Inner branch of the uropoda extends beyond the apex of the caudal segment.......................................*Ethelum modestum* (Dollfus)

  b′. Prosepistoma with a shield-like convexity. Coxopodite of the second segment of the thorax hardly visible, only a very small dentiform process before the leg. Caudal segment flat, with rounded apex. Inner branch of the uropoda reaches two-thirds the length of the caudal segment.
Ethelum americanum (Dollfus)

a′. Surface of body slightly granulated, with the side parts of the thoracic segments (two to seven) and the abdominal segments bent downward. Caudal segment with blunt rounded apex. Inner branch of the uropoda reaches two-thirds the length of the caudal segment.....................*Ethelum reflexum* (Dollfus)

ETHELUM MODESTUM (Dollfus).

Mesarmadillo modestus Dollfus, Proc. Zool. Soc. London, 1896, p. 397.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 573.

Ethelum modestum Budde-Lund, A Revision of "Crustacea Isopoda Terrestria," 1899, p. 25; Ent. Meddel. (2), I, Pt. 2, 1899, p. 91.

Locality.—St. Vincent, West Indies. Dry forest, leeward, under a log, 800 feet.

"Body rather convex and narrow, smooth. Prosepistoma plain, continuous with the forehead in the middle, and separated from it on both sides by a transverse, incomplete, preocular cut. Eyes moderate; ocelli about 16. Antennæ short, flagellum very small, first joint three times shorter than the second. Pereion: first segment with the anteromedian tubercle hardly perceivable; coxopodites distinct on the entire length of the edge of the segment, with the hind part diverging and covered by the posterior angle of the segment. Coxopodite of the second segment forming a nearly inconspicuous ridge before the leg. Pleon, telson: pleotelson triangular; sides feebly curved; apex pointed.

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[a] See Budde-Lund for characters of genus, A revision of Crustacea Isopoda Terrestria, 1899, Pt. 1, Eubelum, p. 24.

Uropoda: basis with a large oblong processus; endopodites extending beyond the apex of the pleotelson; exopodites small, placed at the top of the basal processus. Color: gray or reddish, with small light lineolæ on the pereion; uropoda light. Dimensions: 6 by 2½ mm."—Dollfus.[a]

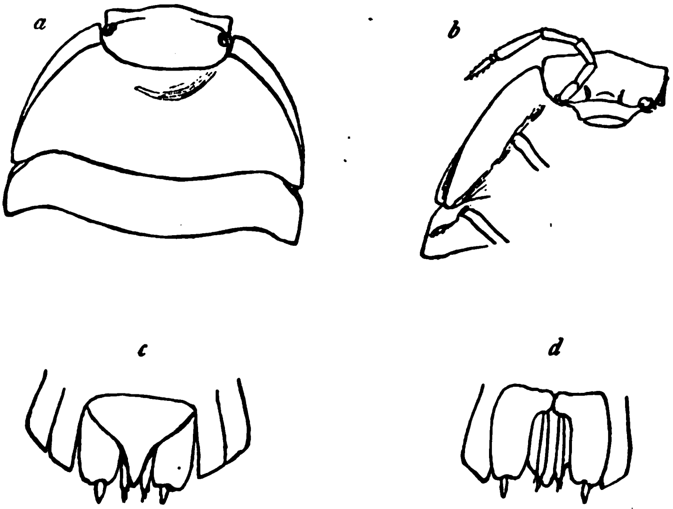

Fig. 648.—Ethelum modestum (After Dollfus). a, Head and first two segments of thorax (upper side). b, The same (underside). c, Fifth and sixth segments of abdomen and uropoda (upper side). d, The same (underside).

ETHELUM AMERICANUM (Dollfus).

Mesarmadillo americanus Dollfus, Proc. Zool. Soc. London, 1896, pp. 397-398.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 573.

Ethelum americanum Budde-Lund, A Revision of "Crustacea Isopoda Terrestria," 1899, p. 24; Ent. Meddel. (2), I, Pt. 2, 1899, p. 90.

Locality.—St. Vincent, West Indies. Sugar-cane field, under decaying cane-leaves. Leeward, lowland near sea, under stones; under old boards, 250 feet; under rubbish, shady place.

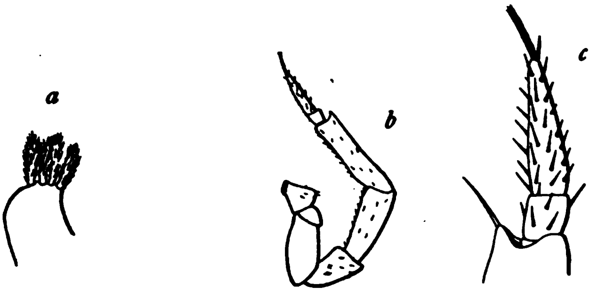

Fig. 649.—Ethelum americanum (After Budde-Lund). a, Apex of inner lacinia of first right maxilla. × 130. b, Left antenna. × 25. c, Flagellum of left antenna. × 70.

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[a] Proc. Zool. Soc. London, 1896, p. 397.

"Body convex, rather narrow, smooth. Cephalon: prosepistoma with a small shield-like convexity; the prosepistoma is continuous with the forehead in the middle and separated from it on both sides by a transverse, incomplete, preocular cut. Eyes moderate; ocelli about 12. Antennæ short; flagellum small, first joint three times shorter than the second. Pereion: first segment with the antero-median tubercle hardly perceivable; coxopodites distinct on the entire length of the edge of the segment (upper side), forming a thick border, slightly crossed by the posterior angle of the segment. Coxopodite of the second segment hardly visible as a very small dentiform processus before the legs. Pleon, telson: pleotelson flat, with curved sides and rounded apex. Uropoda: basis with a large, oblong processus, extending between the lateral part of the fifth segment of the pleon and the pleotelson; endopodite reaching to two-thirds the length of the pleotelson; exopodite minute, placed at the top of the basal processus. Color: brownish, with small light lineolæ on the pereion; flagellum white; uropoda reddish. Dimensions: 6 by 2¼ mm."—Dollfus.[a]

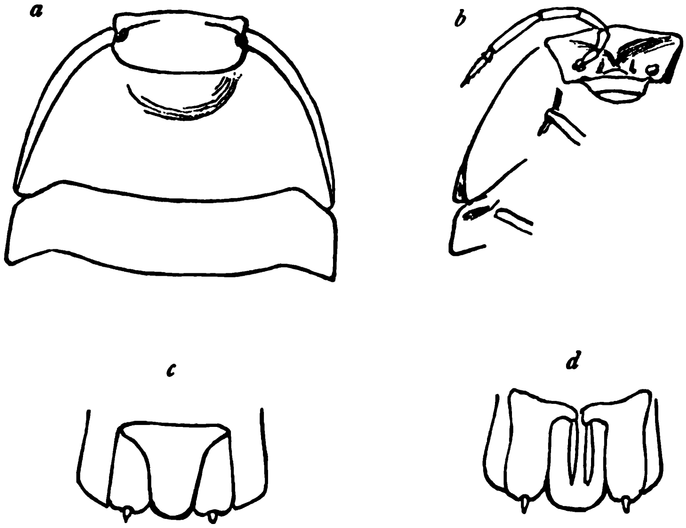

Fig. 650.—Ethelum americanum (After Dollfus). *a*, Head and first two segments of thorax (upper side). *b*, The same (underside). *c*, Fifth and sixth segments of abdomen (upper side). *d*, The same (underside).

ETHELUM REFLEXUM (Dollfus).

Mesarmadillo reflexus Dollfus, Proc. Zool. Soc. London, 1896, pp. 398–399.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 573.

Ethelum reflexum Budde-Lund, A Revision of "Crustacea Isopoda Terrestria," 1899, pp. 25–26; Ent. Meddel. (2), I, Pt. 2, 1899, pp. 91–92.

Locality.—St. Vincent, West Indies. Open, swampy land, under rubbish.

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[a] Proc. Zool. Soc. London, 1896, pp. 397–398.

"Body slightly granulated, very convex, and narrowed backward, the side parts of the pereion (segments 2–7) and of the pleon tending downward. Cephalon: prosepistoma with a shield-like triangular convexity; the prosepistoma is continuous with the forehead in the middle and separated from it on both sides by a transverse, incomplete, preocular cut. Eyes moderate; ocelli about 12. Antennæ short; flagellum small, first joint four times shorter than the second. Pereion: first segment with the antero-median tubercle hardly perceivable; coxopodites distinct on the entire length of the edge of the segment. Coxopodite of the second segment hidden under the bent side part of the segment. Pleon, telson: the lateral parts being nearly folded underneath, the hind edge of segments (3–5) seems straight from a dorsal view. Pleotelson flat, with curved sides and a blunt, rather rounded apex. Uropoda: basis with a large oblong processus; endopodite reaching to two-thirds the length of the pleotelson; exopodite small, placed at the top of the basal processus. Color: dark brown, flagellum whitish. Dimensions: 5 by 2 mm. (much decreasing backward."—DOLLFUS.[a]

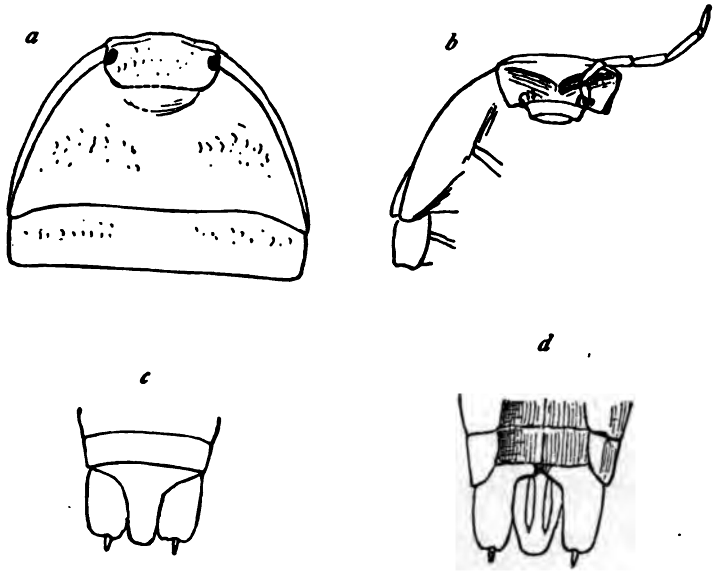

FIG. 651.—ETHELUM REFLEXUM (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UPPER SIDE). *b*, THE SAME (UNDERSIDE). *c*, FIFTH AND SIXTH SEGMENTS OF ABDOMEN AND UROPODA (UPPER SIDE). *d*, THE SAME (UNDERSIDE).

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[a] Proc. Zool. Soc. London, 1896, pp. 398–399.

Family XXV. ONISCIDÆ.[a]

Body oval or oblong, rather convex, very little or scarcely contractile, very rarely convex; with difficulty contractile into a ball.

Second pair of antennæ generally long, with the flagellum composed of only a few articles. Antennal foramina large. Pleural parts of the head distinctly separated by a vertical marginal line and an inframarginal line. Cypeus arched. Eyes generally well developed, compound. Molar expansion of mandibles obsolete, without any triturating surface, it being replaced by brush-like setæ. First maxillæ with the outer lobe tipped with spines, the inner lobe furnished with two plumose processes. Second maxillæ bilobate at the tip. Maxillipeds with palp composed of three articles and but little longer than masticatory lobe; masticatory lobe truncate at tip; epignath large.

There are six thoracic segments in the young before they are hatched.

The legs are generally long. The uropoda are produced, always extending beyond the terminal segment and the preceding segment.

First and second pairs of pleopoda modified in the male, the inner branch of the second pair terminating in a slender stylet.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY ONISCIDÆ.[b]

a. Flagellum of second antennæ composed of less than four articles.

b. External opercular ramus of the abdominal appendages containing no special respiratory organ. Flagellum of external antennæ triarticulate.

c. Epimera of thoracic segments large, with all the posterior angles acute. Abdomen not abruptly narrower than thorax. First two abdominal segments very short, three following ones large, with large acute epimera.

d. Front of head produced at the middle and at the sides in tubercles; lateral tubercles horn-like.............................Genus *Alloniscus* Dana

d′. Front and sides of head not produced in tubercles. With or without lateral lobes.

e. Surface of body smooth...................Genus *Lyprobius* Budde-Lund

e′. Surface of body granulated or tuberculate.

f. Terminal segment of body short, widely rounded posteriorly. Basal article of uropoda broadly expanded inside. Inner branches contiguous along their inner lateral margins..Genus *Synuropus* Richardson

f′. Terminal segment of body conically produced. Basal joint of uropoda oblong...............................Genus *Oniscus* Linnæus

c′. Epimera of thoracic segments small. Abdomen abruptly narrower than thorax; first two segments generally equal in length to those following; epimera very small, but manifest...............Genus *Philoscia* Latreille

b′. External opercular ramus of the first and second pairs of abdominal appendages furnished with tracheæ. Flagellum of external antennæ biarticulate.

c. Second maxilla not larger than first maxilla, and bilobed at the tip.

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[a] See Budde-Lund for characters of family, Crustacea Isopoda Terrestria, 1885, p. 75, and G. O. Sars, Crustacea of Norway, II, 1899, pp. 169–170.

[b] The genus *Acanthoniscus* (White) Kinihan is not included in the key.

d. Abdomen not abruptly narrower than thorax. Epimera of abdominal segments large.

e. Body very convex, capable of being rolled up into a perfect ball. Articles of flagellum of external antennæ subequal. External branches of the uropoda equal in both sexes. External opercular ramus of all the abdominal appendages furnished with tracheæ.....Genus *Cylisticus* Schnitzler

e′. Body more or less depressed, scarcely contractile. Articles of flagellum of external antennæ with the first article generally longer than the second, often subequal, or even a little shorter. External opercular ramus of the first and second pairs of abdominal appendages furnished with tracheæ.

f. Second antennæ long; first article of the flagellum generally longer than the second. Outer branch of the uropoda flattened, and longer in male than in female ....Genus *Porcellio* Latreille

f′. Second antennæ short; flagellum with first article much shorter than second. Outer branch of the uropoda conical, and not longer in male than in female ....Genus *Leptotrichus* Budde-Lund

d′. Abdomen abruptly narrower than thorax. Epimera of abdominal segments small.

e. First article of flagellum of external antennæ generally longer than second.
Last abdominal segment reaches sufficien nd the epimera of the
preceding segment. External op the first and second
pairs of abdominal append ird or of all the pairs,
furnished with trache *toponorthus* Budde-Lund
article shorter than the
much beyond the epimera
ular ramus of the first and
nished with tracheæ.
Genus *Rhyscotus* Budde-Lund

c′. Second first maxilla and not bilobed
at the tip Genus *Hypergnathus*, new genus

a′. Flagellum of secon articles.
Genus *Actoniscus* Harger

103. Gen SCUS Dana.[a]

Body rather convex, very carcely at all contractile.

Front of head produced in the m le and at the sides into tubercles, the lateral tubercles being prominent and horn-like. Epistome swollen within between the antennæ, and slightly carinated. Flagellum of second pair of antennæ composed of three articles. Frontal marginal line wanting, vertical marginal line passing through the pleuræ of the head behind the eyes.

Epimeral parts of the thoracic segments small, not much expanded.

Abdomen not abruptly narrower than the thorax, with the pleural lamellæ of the third, fourth, and fifth segments large.

Legs very spinulose.

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[a] See Budde-Lund for characters of genus, Crust. Isop. Terrestria, 1885, p. 224.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ALLONISCUS.

a. Surface of body very densely granulated. Epimera with the anterior angles serrate .... *Alloniscus mirabilis* (Stuxberg)

a'. Surface of body punctate. Epimera with the anterior angles not serrate.

  b. Lateral processes of the head large, prominent. *Alloniscus cornutus* Budde-Lund

  b'. Lateral processes of the head small, scarcely prominent. *Alloniscus perconvexus* Dana

ALLONISCUS MIRABILIS (Stuxberg).

Rhinoryctes mirabilis Stuxberg, Öfvers. Vet. Akad. Forhandl., 1875, No. 2, p. 51.

Alloniscus mirabilis Budde-Lund, Crust. Isop. Terrestria, 1885, p. 229.

Rhinoryctes mirabilis Underwood, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 363.

Alloniscus mirabilis Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 864; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 332; American Naturalist, XXXIV, 1900, p. 305.

Locality.—California.

Body oval, twice as long as wide, convex, very densely granulated; epimera serrate on the margins. Second pair of antennæ much shorter than the width of the body (85:100); the fifth article of the peduncle very long, not very much curved, equal in length to the three articulate flagellum; the articles of the flagellum equal to each other in length or the middle one sometimes smallest.

Eyes prominent, subcircular, with numerous ocelli.

The frontal median lobe large, produced, obtuse, extended upward, equal to a fourth part of the width of the head; lateral lobes produced, conical, anteriorly rounded, equal to the eyes in length.

All the segments of the thorax with the posterior margin sinuated in the middle. Epimera moderately large, with the anterior angles gradually more rounded posteriorly, serrate, the posterior angles roundly acuminate not very much directed backward.

Abdomen subcircular, a little wider than long, all the segments equal in length, the epimera of the first and second segments vanishing, those of the third, fourth, and fifth segments large, directed backward, rounded on the exterior margin, serrate, almost straight on the inner margin. The last segment is triangular, twice as wide as long, with the posterior margins straight, roundly acuminate, rather convex above and sometimes furnished with a longitudinal furrow not at all deep. The uropoda have the basal article almost as wide as long, depressed, with the post-lateral margin very little elevated, circularly rounded, serrate, the outer branch a little flattened, subconical, with the exterior margin straight, the inner margin convex, extending not much beyond the inner branch in length, which extends very little beyond the last segment of the abdomen.

Color of the dorsal surface reddish or dark gray, the frontal lobes, especially the middle one, and a longitudinal band on the thorax darker and covered with very numerous paler oblong spots.[a]

ALLONISCUS CORNUTUS Budde-Lund.

Alloniscus cornutus BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 228–229.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 864; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 332; American Naturalist, XXXIV, 1900, p. 305.

Locality.—California.

Body short, oval, subconvex, obscurely but densely roughened and thickly punctate and setigerous. Second pair of antennæ shorter than half the length of the body (7:17); flagellum shorter than the fifth article of the peduncle; the second article of the flagellum shortest, the first equal in length to the third.

Antero-lateral processes large, narrow, prominent, subconical; front in the middle very much swollen.

The first three segments of the thorax have the posterior margin on both sides slightly sinuated; all the following segments have the posterior margin in the middle rather sinuated posteriorly.

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[a] The above description is adapted from the following one of Stuxberg's:

Rhinoryctes ovalis, longitudine duplo majore quam latitudine, convexus, densissime granulatus, epimeris margine serratis.

Antennæ exteriores corporis latitudine multo breviores (=85:100); pedunculi articulus quintus longissimus, parum curvatus, longitudine flagellum 3: articulatum æquans; flagelli articuli inter se eadem longitudine vel medius interdum minimus.

Oculi, ocellis congregatis, prominentes, subcirculares.

Lobus frontalis medius magnus, productus, obtusus, sursum porrectus, quartam partem latitudinis capitis æquans; lobi laterales producti, conici, antice rotundati, longitudine oculos æquantes.

Trunci segmenta omnia margine postico medio sinuata. Epimera mediocria, angulis anticis post sensim magis rotundatis, serratis, angulis posticis parum retroversis, rotundate-acuminatis.

Cauda subcircularis, latitudine paullo majore quam longitudine, omnium segmentorum longitudine æquali, epimeris segmentorum primi et secundi evanescentibus, tertii, quarti, quinti maximis, retroversis, margine exteriore rotundatis, serratis, interiore fere rectis. Segmentum ultimum trigonum, duplo latius quam longius, marginibus posticis rectis, rotundate-acuminatum, supra convexiusculum et interdum fovea longitudinali haud profunda instructum.

Pedum ultimi paris articulus basalis fere æque latus ac longus, depressus, margine postico-laterali parum elevato, circulariter rotundato, serrato, appendix exterior paullum complanata, subconica, margine exteriore recto, interiore convexo, longitudine appendicem interiorem haud multo superans, quæ ultimum caudæ segmentum parum excedit.

Color dorsi rufo-vel fusco-griseus, lobis frontalibus, præsertim medio, vittaque trunci longitudinali nigrioribus, maculis oblongis numerosissimis pallidioribus inspersis.

Longitudo, 10 mm.; latitudo, 4.5–5 mm.; altitudo, 2.3–2.5 mm.—STUXBERG, Øfvers. Vet. Akad. Forhandl., 1875, No. 2, p. 51.

The first two segments of the abdomen scarcely shorter than the other segments; the epimera of the third, fourth, and fifth segments strong, subtetragonal.

The terminal abdominal segment is triangular, short, hardly twice as wide as long, rather convex above.

The basal article of the uropoda is very wide, depressed; the outer branch is carinated, with the apex rounded; the inner branch is inserted at the inner angle of the basal article. Color grayish, pale on the sides. Length, 8.5 mm.; width, 5 mm.; height, 2 mm.[a]

ALLONISCUS PERCONVEXUS Dana.

Alloniscus perconvexus Dana, Proc. Acad. Nat. Sci. Phila., VII, 1854, p. 176.—Stimpson, Bost. Jour. Nat. Hist., VI, 1857, p. 506.—Budde-Lund, Crust. Isop. Terrestria, 1885, p. 225.—Underwood, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 360.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 864; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 332; American Naturalist, XXXIV, 1900, p. 305.

Localities.—California; Pacific Grove; Santa Barbara; Monterey Bay; Tillamook Head, Oregon. Dug at mean-tide mark from sandy shore.

Body ovate, very convex, not quite twice as long as broad, 9 mm.: 16 mm.

Head twice as wide as long, 2 mm.: 4 mm., with the antero-lateral angles produced on either side into an acute process, "horn-like," situated just in front of the eye, and the front produced in the middle in a large, widely rounded median lobe, extending as far as the lateral process. The eyes are small, oblong, composite, and situated in the antero-lateral angles of the head close to the lateral margins. The first pair of antennæ are rudimentary and inconspicuous. They are composed of three small articles. The second pair of antennæ have

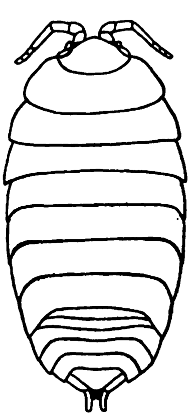

Fig. 652.—Alloniscus perconvexus.

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[a] The above description is adapted from the following one of Budde-Lund's:

Breviter ovalis, subconvexus, obscure sed dense squamatus et punctis setigeris crebratus. Antennæ exteriores corpore dimidio breviores (7:17); flagellum scapi articulo quinto brevius; flagelli articulus secundus brevissimus, primus tertio æqualis.

Processus frontales laterales majores, angustiores, prominentes, subconici; frons media valde tumosa.

Trunci annuli tres priores margine posteriore utrinque leviter sinuato; annuli sequentes omnes margine posteriore medio post magis sinuato.

Caudæ annuli duo priores ceteris annulis vix breviores; epimera annuli 3-4-5 valida, subtetragona. Annulus analis, triangulus, brevis, ægre duplo latior quam longior, supra convexiusculus.

Articulus basalis pedum analium perlatus, depressus; extus carinatus, apice rotundato; ramus interior angulo interiori articuli basalis insertus.

Color griseus, in lateribus dilutior.

Longitudo, 8.5 mm.; latitudo, 5 mm.; altitudo. 2 mm.—Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 228-229.

the basal article short; the second is about twice as long as the first; the third and fourth are subequal and each is a little longer than the second; the fifth is one and a half times as long as the fourth. The flagellum is composed of three subequal articles. The antennæ are covered with small spines. The maxillipeds have a palp of three articles. The palp of the mandibles is wanting.

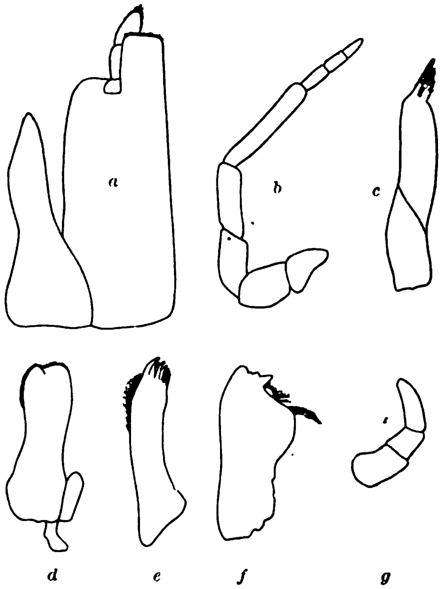

FIG. 653.—ALLONISCUS PERCONVEXUS. *a*, MAXILLIPED. ×20½. *b*, SECOND ANTENNA. ×11½. *c*, FIRST MAXILLA (INNER LOBE). ×39. *d*, SECOND MAXILLA. ×20½. *c*, FIRST MAXILLA (OUTER LOBE). ×20½. *f*, MANDIBLE. ×20½. *g*, FIRST ANTENNA. ×39.

The first segment of the thorax is 2 mm. in length and is a little longer than any of the others, which are subequal and each is about 1½ mm. long. The lateral margins of all the segments are straight and contiguous. On the first four segments the epimera are indicated by a distinct longitudinal suture, which on the first segment is confined to the posterior half of the segment, but in the three following segments extends the entire length of the segment. There are no suture lines on the last three segments.

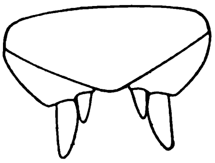

FIG. 654.—ALLONISCUS PERCONVEXUS. TERMINAL SEGMENT OF ABDOMEN WITH UROPODA. ×11½.

The abdomen is as wide as the thorax. The first two segments have the lateral parts covered by the seventh thoracic segment. The sixth or terminal segment is triangular in shape and is twice as wide as long, being 3 mm. wide at the base and 1½ mm. long. The uropoda extend 1 mm. beyond the extremity of the abdomen. The peduncle does not extend beyond the abdomen. The inner ᵇ ˡʸ to the middle of the outer branch and is mo

All the legs hairs.

104. Genus LYPROBIUS Budde-Lund.[a]

Body not convex, scarcely contractile. Head produced into lobes at the side; front not produced in the middle, marginate. Epimera of the third, fourth, and fifth segments of the abdomen large.

Peduncle of the uropoda short and wide, with the outer side sulcate.

Epimera of the thoracic segments moderately large; those of the first three segments with the posterior angles roundly obtuse, those of the fourth segment with the posterior angles straight, and those of the three posterior segments with the posterior angles acute.

Body setigerous, scarcely granulated.

Flagellum of second antennæ composed of three articles.

LYPROBIUS PUSILLUS Budde-Lund.

Lyprobius pusillus Budde-Lund, Crust. Isop. Terrestria, 1885, p. 230.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 864; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 333; American Naturalist, XXXIV, 1900, p. 305.

Locality.—California.

Body oval, rather convex, smooth, punctate, very minutely setigerous, especially so posteriorly.

Second pair of antennæ a little shorter than half the length of the body; first article of the flagellum equal in length to the third, almost half as long as the second.

Antero-lateral lobes small, rounded. Front, with the median marginal line entire, a little arched and produced.

The terminal segment of the abdomen is triangulate in the middle, produced, and extends a little beyond the epimera of the fifth abdominal segment; terminal segment a little excavate above.

Color uniformly brown, transparent on the margins, white.

Length 5 mm. Width 2.5 mm. Height 1.2 mm.[b]

105. Genus SYNUROPUS Richardson.

Body oval, not contractile into a ball, with the segments laterally expanded, as in *Oniscus*.

Head with lateral and frontal lobes. Second pair of antennæ long, with flagellum composed of three articles.

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[a] For characters of genus see Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 229–230.

[b] The above description is adapted from the following one of Budde-Lund's:

Ovalis, convexiusculus, sublævis, punctatus, minutissime præsertim post setiger.

Antennæ exteriores corpore dimidio paulo breviores; flagelli articulus primus tertio æqualis, secundo fere duplo brevior.

Lobi frontales laterales parvi, rotundati. Frons media linea marginali integra paulum curvate producta.

Caudæ annulus analis medio triangulo, producto, epimera annuli præanalis paulum superante, supra paulum excavatus.

Color uniformis brunneus, in marginibus perlucens, albidus.

Longitudo 5 mm., latitudo 2, 5 mm., altitudo 1, 2 mm.—Budde-Lund, Crust. Isop. Terrestria, 1885, p. 230.

Abdomen not narrower than thorax; pleural lamellæ large.

Terminal segment of body much broader than long, widely rounded posteriorly, not conically produced as in *Oniscus*. · Basal joint of the uropoda large, broadly expanded inside, not oblong as in *Oniscus;* inner branches close together, their internal lateral margins contiguous. Inner branch inserted but little or scarcely at all in advance of the outer branch, situated close to the inner post-lateral angle of the peduncle. Outer branch somewhat longer than inner branch.

SYNUROPUS GRANULATUS Richardson.

Synuropus granulatus RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 563–564.

Locality.—El Yunque, Porto Rico, at an altitude of 2,800 feet.

Body oval, not able to be contracted into a ball, with the lateral parts of the segments expanded.

Entire surface of body covered with small tubercles.

Head deeply set in the first thoracic segment, the rounded anterior angulations of which reach the antero-lateral angles of the head. The anterior margin of the head is produced in an obtusely pointed median lobe. The lateral lobes are very acute. The antennæ are geniculate at the articulation of the fourth and fifth peduncular joints; the flagellum consists of three joints.

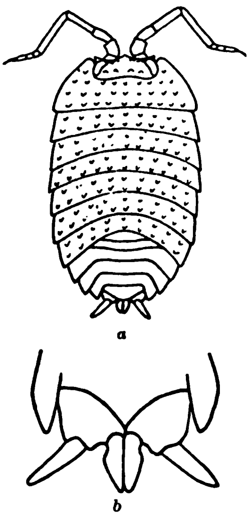

FIG. 655.—SYNUROPUS GRANULATUS. *a*, DORSAL VIEW. *b*, UROPODA.

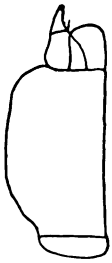

FIG. 656.—SYNUROPUS GRANULATUS. MAXILLIPED.

The first thoracic segment is longest; the others are subequal. The abdomen is not narrower than the thorax. The first two segments have their lateral margins concealed. The three following have their lateral margins broadly expanded. The terminal segment is twice as broad as long, with the posterior margin broadly rounded. The basal joints of the uropoda are large, being partly covered by the terminal segment of the body. The outer branch is styliform and extends its entire length beyond the terminal abdominal segment. The inner branches are situated close together in such a way that the inner lateral margins are contiguous throughout their length.

The legs are ambulatory, similar, and subequal.

Color brown, mottled with black.

One specimen was collected by Dr. L. Stejneger at El Yunque, Porto Rico, at an altitude of 2,800 feet.

Type.—Cat. No. 23912, U.S.N.M.

106. Genus ONISCUS Linnæus.[a]

Body broad, depressed, very little or scarcely contractile. Surface of body granulated or tuberculate. Head with well-defined lateral lobes; front marginate, not produced in the middle. Abdomen not abruptly narrower than thorax; third, fourth, and fifth segments with epimera large, acute, and produced backward. Terminal segment greatly produced. Eyes large, lateral. Second pair of antennæ long; flagellum composed of three articles.

Opercular plates of the pleopoda without tracheæ.

Uropoda produced, with the inner branch inserted far in front of the outer, near the inner antero-lateral angle of the peduncle.

Lateral parts of the thoracic segments expanded; posterior angles of all the epimera acute.

ONISCUS ASELLUS Linnæus.

Oniscus asellus LINNÆUS, Fauna Suecica, 2d ed., 1761, p. 500.

Oniscus murarius CUVIER, Jour. Hist. Nat., II, 1792, p. 23, pl. xxvi, figs. 11-13.

Oniscus affinis SAY, Journ. Acad. Nat. Sci. Phil., I, 1818, pp. 430-431.

Oniscus vicarius STUXBERG, Öfvers. Svenska Vet. Akad., Forh., 1872, Pt. 9, p. 3; 1875, Pt. 2, p. 50.

Oniscus asellus BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 202-204.

Oniscus affinis UNDERWOOD, Bull. Ill. State Lab. Nat Hist., II, 1886, p. 361.

Oniscus vicarius UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 361.

Oniscus asellus SARS, Crust. Norway, II, 1899, pp. 171-172.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 305; Proc. U. S. Nat. Mus., XXIII, 1901. pp. 562-563.

Oniscus affinis RICHARDSON, American Naturalist, XXXIV, 1900, p. 305; Proc. U. S. Nat. Mus., XXIII, 1901, p. 563.

Oniscus asellus STOLLER, 54th report New York State Museum, 1902, p. 213.—PAULMIER, Bull. New York State Museum, 1905, pp. 180-181.

Localities.—Greenland; North America, at Woods Hole, Massachusetts; Salem, and Beverly, Massachusetts; New York City; Schenectady, New York; Rock Island, Illinois; Providence, Rhode Island; Syracuse, New York; Freeport, Maine; Pennsylvania; also Sweden; Denmark; Germany; Newfoundland; Canada, near Niagara; Holland; Great Britain; France; Spain; Italy; Azores; Iceland; coast of Norway; "Ashensee Tyrol" 950 meters alt. (Dr. Stejneger).

Found under dead logs, dead leaves, and stones; common in hothouses.

Specimens identified by Dr. Joseph Leidy as *Oniscus affinis* Say and sent to me by Doctor Calvert of the University of Pennsylvania, do not differ from specimens of *Oniscus asellus* in the U. S. National Museum collection.

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[a] See Budde-Lund for characters of genus, Crustacea Isopoda Terrestria, 1885, p. 202, and Sars, Crustacea of Norway, II, 1899, pp. 170-171.

Body oblong-ovate, about one and a half times longer than wide, 10 mm. : 16 mm.

Head wider than long, 2 mm. : 3 mm., with the frontal margin slightly convex and pronounced antero-lateral lobes, narrow and elongated, almost 1 mm. in length and rounded anteriorly. The eyes are small, composite, and situated at the sides of the head, at the base of the antero-lateral lobes. The first pair of antennæ are small and inconspicuous and are composed of two articles. The second antennæ have the basal article short; the second article is twice as long as the first; the third is equal in length to the second; the fourth is nearly twice as long as the third; the fifth is one and a half times as long as the fourth.

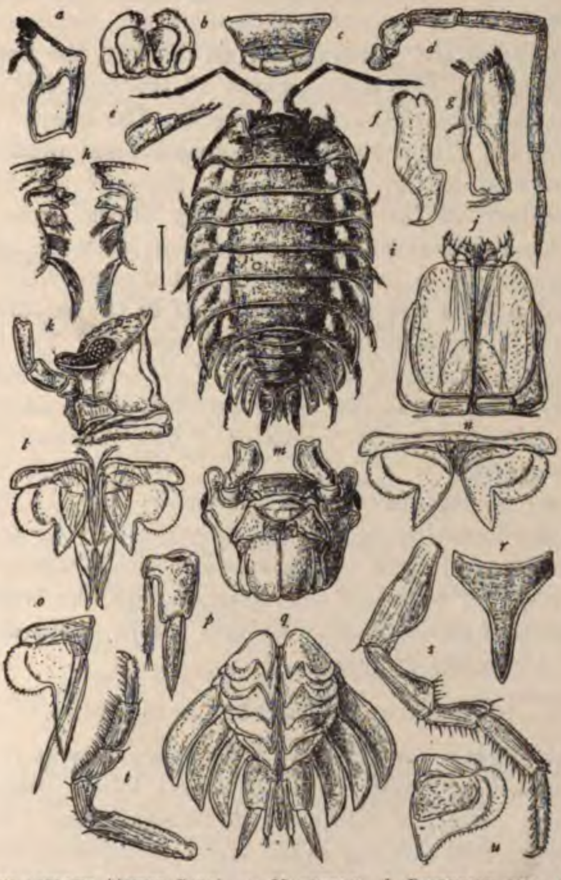

Fig. 657.—Oniscus asellus (after Sars). *a*, Mandible. *b*, Posterior lip. *c*, Anterior lip. *d*, Second antenna. *e*, First antenna. *f*, Second maxilla. *g*, First maxilla. *h*, Mandibles. *i*, Dorsal view of body. *j*, Maxillipeds. *k*, Head (lateral view). *l*, First pleopods of male. *m*, Head (ventral view). *n*, First pleopods of female. *o*, Second pleopod of male. *p*, Uropod. *q*, Abdomen (ventral view). *r*, Last segment of abdomen. *s*, Seventh leg. *t*, First leg. *u*, Third pleopod of female.

The flagellum is composed of three articles. When retracted the second antennæ extend to the posterior margin of the third thoracic segment.

The segments of the thorax are subequal in length. The first segment has the antero-lateral angles produced to surround the head, and they extend almost to the extremity of the antero-lateral lobes of the head. The lateral parts of all the segments are expanded, but there is no indication of epimera on any of the segments. The lateral margins are straight.

The segments of the abdomen are all distinct, the first two being somewhat shorter. The lateral parts of the first two are entirely concealed by the seventh thoracic segment. The lateral parts of the third, fourth, and fifth segments are expanded and produced so as to continue the oval outline of the body; those of the fifth segment extend posteriorly as far as the extremity of the sixth or terminal segment. The terminal segment is triangular, with the apex produced in a long process, 2 mm. in length and pointed posteriorly. The basal article or peduncle of the uropoda extends to the middle of the produced portion of the terminal abdominal segment. The inner branch extends to the extremity of the process of the terminal segment and is concealed by it except at the lower portion. The outer branch is 2 mm. long and extends the length of 1 mm. beyond the terminal abdominal segment.

The legs are all ambulatory in character.

In color, the dorsal portion of the body is a dark brown. There is a longitudinal row of light yellow spots on either side of the thorax, about the place of union of the epimera with the segments. The lateral margins of the body are also light yellow. The dorsal portion of the body is slightly granular.

107. Genus PHILOSCIA Latreille.[a]

Body oval, slightly convex, very little or scarcely at all contractile.

Head rounded in front, without lateral lobes. Second pair of antennæ long; flagellum composed of three articles. Frontal marginal line very often wanting in the middle, bent downward on either side, surrounding the epistome and extending to the vertical marginal line back of the eyes.

Abdomen abruptly narrower than thorax; lateral parts of the third, fourth, and fifth segments very small, appressed; terminal segment not much produced.

Opercular plates of the pleopoda without tracheæ. Uropoda with the inner branch not attached far in front of the outer branch.

Lateral parts of the thorax but slightly expanded.

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[a] For characters of genus see Budde-Lund, Crust. Isop. Terrestria, 1885, p. 207, and Sars, Crust. of Norway, II, 1899, pp. 172–173.

ANALYTICAL KEY[a] TO THE SPECIES OF THE GENUS PHILOSCIA.

a. Surface of body smooth, without spines.
  b. Terminal segment of body broadly rounded posteriorly. *Philoscia richmondi* Richardson
  b'. Terminal segment of body posteriorly triangular, with apex more or less produced.
    c. Second antennæ short, shorter than half the length of the body.
      d. Front of head indistinctly trilobate .... *Philoscia culebræ* Moore
      d'. Front of head straight or very slightly arched.
        e. Body striped with two broad dorsal bands .... *Philoscia vittata* Say
        e'. Body violet, covered with white spots, the margins of the segments being white .... *Philoscia brevicornis* Budde-Lund
    c'. Second antennæ very long, much longer than half the length of the body. *Philoscia bermudensis* Dahl
a'. Surface of body covered with numerous spines .... *Philoscia spinosa* Say

PHILOSCIA RICHMONDI Richardson.

Philoscia richmondi RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 564–565.

Locality.—El Yunque, Porto Rico, at an altitude of 2,800 feet.

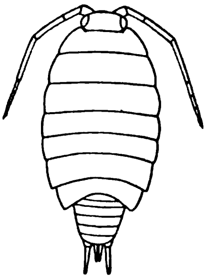

FIG. 658.—PHILOSCIA RICHMONDI.

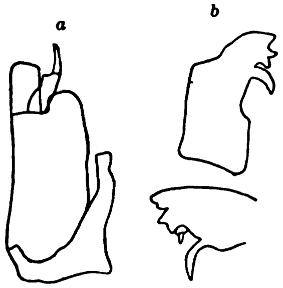

FIG. 659.—PHILOSCIA RICHMONDI. *a*, MAXILLIPED. *b*, MANDIBLE.

Body oval; surface smooth. Head not set in the first thoracic segment, evenly rounded, with no lateral or frontal lobes. Eyes large, well developed, lateral. Antennæ equal to half the length of the body; flagellum composed of three joints.

Segments of thorax subequal.

Abdomen abrubtly narrower than thorax, with the lateral processes of the segments not projecting. Terminal segment equal in length to the preceding segment, much broader than long, and with the posterior margin broadly rounded. The basal joint of the uropoda projects beyond the terminal segment of the body. The inner branch extends to the middle of the outer branch.

Legs gradually increasing in length.

Color, mottled brown and yellow.

A number of specimens were collected by Dr. C. W. Richmond and Dr. L. Stejneger at El Yunque, Porto Rico, at an altitude of 2,800 feet. Named for Dr. C. W. Richmond, of the U. S. National Museum.

Type.—Cat. No. 23913, U.S.N.M.

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[a] The description of *Philoscia nigricans* Budde-Lund does not give sufficient characters to place it in the key.

PHILOSCIA CULEBRÆ Moore.

Philoscia culebræ MOORE, Bull. U. S. Fish Commission, XX, Pt. 2, 1902, p. 176, pl. XI, figs. 13–17.

Locality.—Culebra, Porto Rico, from drift on shore.

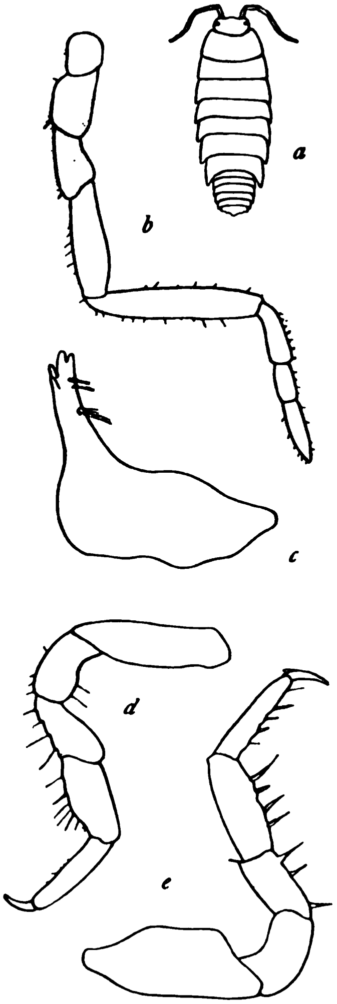

FIG. 660.—PHILOSCIA CULEBRÆ (AFTER MOORE). *a*, DORSAL VIEW. *b*, SECOND ANTENNA. *c*, MANDIBLE. *d*, FIRST LEG. *e*, FOURTH LEG.

"Body elongate-oval, about 2.5 times as long as broad; head about twice as broad as long, front somewhat recurved between sides and middle, producing the appearance of a small lobe in front of each eye, sides and posterior margin rounded; first segment of thorax longest, its anterior and posterior margins strongly curved, anterior angle rounded and projecting somewhat beyond sides of head; next six segments subequal in length, second, third, and fourth widest, the last three successively narrower; posterior angles of last four segments produced, successively increasing in length, that of last reaching almost to posterior border of third abdominal segment; abdomen almost as long as last three segments of thorax, gradually decreasing in width posteriorly; segments subequal in length, the sides of the first more or less concealed by the lateral angle of the last thoracic segment; telson short, hardly longer than other segments, produced to a blunt point in median line posteriorly.

"Eyes moderate (for the genus); first antennæ minute, second antennæ when laid against sides of body extending to about end of second thoracic segment, spinulose; peduncle, five-jointed; first joint, short; second and third, equal; fourth, longer; fifth, longest, equal to third and fourth combined; flagellum three-jointed, about equal to last joint of peduncle. Mandible with narrow four or five dentate tip, at the base of which are two plumulose setæ, and lower down a brush of fine setæ; no palp. First maxillæ with inner plate furnished with several small spines; outer plate with many.

"The legs increase slightly in length from before backward and are furnished with long acute spines. The uropods are broken off.

"From Culebra. Two specimens, under drift on shore, 4.2 by 1.6 mm."—MOORE.[a]

PHILOSCIA VITTATA Say.

Philoscia vittata SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 429.—DE KAY, Zool. New York, Crust., 1844, p. 50.—WHITE, List Crust. Brit. Museum, 1847, p. 99.—HARGER with VERRILL, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 569 (275); Proc. U. S. Nat. Mus., II, 1879, p. 157; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 306–307, pl. I, fig. 1.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 361.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 305; Proc. U. S. Nat. Mus., XXIII, 1901, p. 565.—PAULMIER, Bull. New York State Museum, 1905, p. 181.

Localities.—Great Egg Harbor, New Jersey, to Barnstable, Massachusetts; Salem, Massachusetts; Freeport, Long Island. Found under stones, wood, etc., in moist places; under rubbish along the shore; underside of boards above high water.

Body oblong-ovate, a little more than twice as long as wide, 3 mm.: 6½ mm.

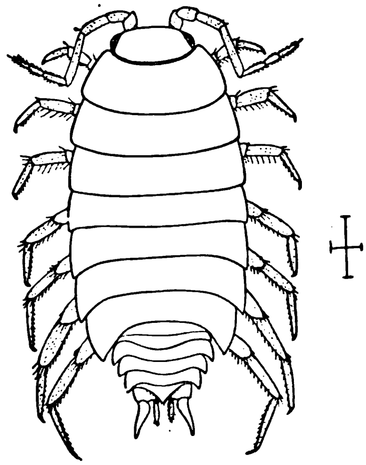

FIG. 661.—PHILOSCIA VITTATA (AFTER HARGER). × 6.

Head wider than long, 1 mm.: 1½ mm., with the anterior margin rounded and not produced into a lobe. The antero-lateral angles of the head are rounded and not produced into lobes. The eyes are small, round, and composite, and situated in the antero-lateral angles of the head. The first pair of antennæ are small, rudimentary, and incon-

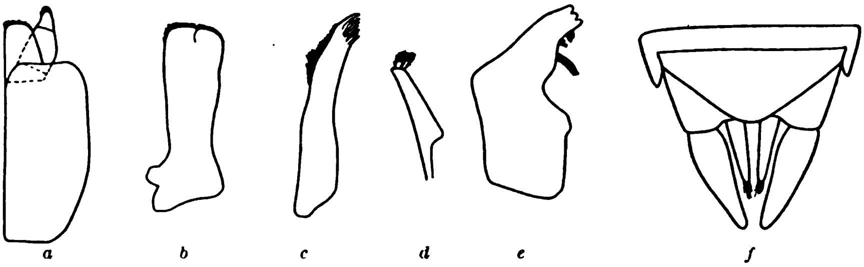

FIG. 662.—PHILOSCIA VITTATA. *a*, MAXILLIPED. *b*, SECOND MAXILLA. *c*, FIRST MAXILLA (OUTER LOBE). *d*, FIRST MAXILLA (INNER LOBE). *e*, MANDIBLE. *f*, TERMINAL SEGMENT OF ABDOMEN, WITH UROPODA.

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[a] Bull. U [illegible] XX, Pt. 2, 1902, p. 176.

spicuous. The first article of the second antennæ is short; the second and third are subequal and each is more than twice as long as the first; the fourth is nearly twice as long as either of the two preceding; the fifth is one and a half times longer than the fourth. The flagellum is composed of three nearly subequal articles, the third being a little longer than the second. The second antennæ extend to the posterior margin of the third thoracic segment. The maxilliped has a palp of three articles. The palp of the mandibles is wanting.

The segments of the thorax are subequal, the first segment being, perhaps, a little longer than any of the others. There are no epimera separated off on any of the segments.

The abdomen is abruptly narrower than the thorax. The first two segments are covered at the sides by the seventh thoracic segment. The lateral parts of the segments are not developed. The sixth, or terminal segment, is triangular in shape, with the apex not produced but rounded. The peduncle of the uropoda extends to the extremity of the abdomen. The inner branch extends half a millimeter beyond the terminal abdominal segment. The outer branch is not half a millimeter longer than the inner branch.

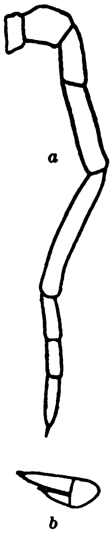

FIG. 663.—PHILOSCIA VITTATA. *a*, SECOND ANTENNA. ×27½. *b*, UROPOD. 51½.

All the legs are ambulatory.

Color brown, with lateral margins light and a narrow longitudinal light area or band in the middle of the dorsal surface, separating the two wide dark bands.

PHILOSCIA BREVICORNIS Budde-Lund.

Philoscia brevicornis BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 218–219.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 305; Proc. U. S. Nat. Mus., XXIII, 1901, p. 565.

Locality.—Biloxi, Mississippi.

Body oblong-oval, subconvex, smooth, slightly covered with a few dots.

Second pair of antennæ shorter than half the length of the body; articles of the flagellum short, subequal.

Frontal margin produced a little in the form of an arch in the middle, almost entirely inconspicuous; epistome subconvex in the middle.

Abdomen scarcely abruptly narrower than the thorax. The terminal segment short, almost triangular, with sides slightly incurved, and apex obtusely rounded; sulcate above.

The color varies in the two specimens, being a very light or a very dark violet, covered with white spots, with the margins white. Legs all yellow, or covered with black dots.

Length 11 mm.; width 5 mm.; height 2.5 mm.[a]

PHILOSCIA BERMUDENSIS Dahl.

Philoscia bermudensis Dahl, Plankton Expedition, I, 1892, Pt. 1, p. 111, pl. III, figs. 2, 4, 5, 7, 8, 10, 13.

Locality.—Bermudas.

This species is not described, but well figured and compared with

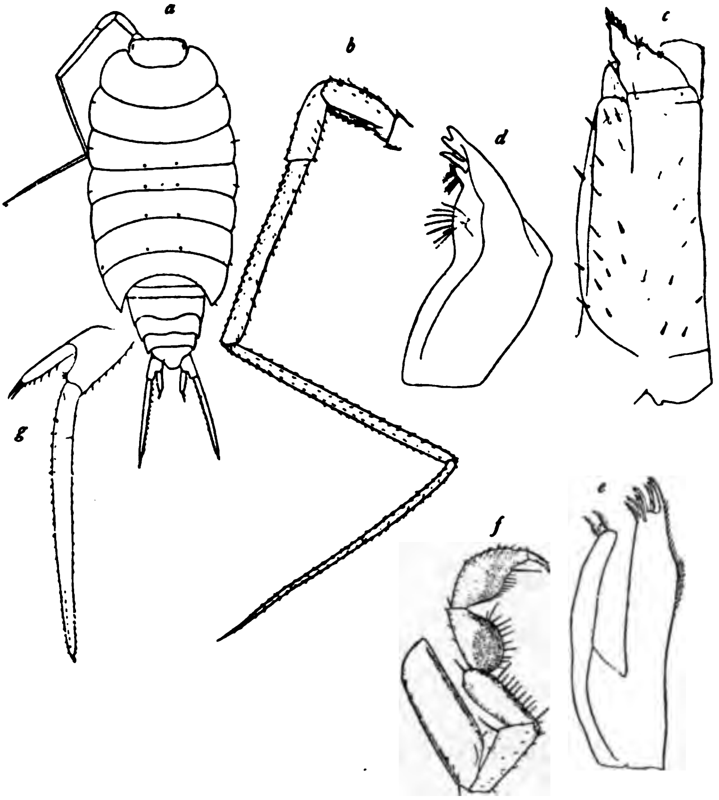

Fig. 664.—Philoscia bermudensis (after Dahl). *a*, General figure. × 5. *b*, Second antenna. × 16. *c*, Maxilliped. × 40. *d*, Mandible. × 40. *e*, First maxilla. × 40. *f*, First leg. × 16. *g*, Uropod. × 16.

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[a] The above description is adapted from the following one of Budde-Lund's:

Oblonge ovalis, subconvexa, nitida, tenuiter et sparse punctata.

Antennæ exteriores corporis dimidio breviores; flagelli articuli breves, subæquales.

Linea marginalis frontalis medio paulum arcuate producta, fere omnino obliterata; epistoma medio subconvexum.

Cauda trunco vix abrupte angustior. Annulus analis brevis, fere triangulus, lateribus leviter incurvis, apice rotundato obtuso, supra sulcatus.

Color variat in duobus speciminibus dilutior vel obscurior violaceus, maculis albidis conspersis, in marginibus late albidus. Pedes toti flavi, vel punctis nigrescentibus conspersis.

Longitudo, 11 mm.; latitudo, 5 mm.; altitudo [illegible] Lund, Crust. Isop. Terrestria, 1885, pp. 218–219.

Philoscia couchi Kinahan, from which it is said to differ (1) in having the second antennæ longer and more slender; (2) in having the uropoda longer and more slender, and (3) in having for eyes small spots of pigment with slight rudiments of ocelli, while in *P. couchi* the eyes seem to have entirely disappeared. Dahl likewise points out that these differences also exist between *Ligia baudiniana* (*hirtitarsis*) and *Ligia oceanica*. He considers that in both cases the *Philoscia* form has arisen independently from the *Ligia* form.

PHILOSCIA SPINOSA Say.

Philoscia spinosa SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 429–430.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 361.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 305; Proc. U. S. Nat. Mus., XXIII, 1901, p. 565.

Locality.—Savannah, Georgia.

"Brown, oblong-oval, with numerous spines above; feet armed with short setæ beneath.

"Inhabits Georgia.

"Cabinet of the academy.

"Body brown, elongate-oval, armed with numerous spine-like tubercles; sixth and seventh segments produced on each side behind, acute, the latter attaining the base of the fifth succeeding joint; abdominal and caudal segments somewhat glabrous, terminal segment surpassing the first joint of the lateral styles; antennæ rough and subspinose before, terminal joint glabrous, pale; feet beneath armed with short distant setæ.

"Length nearly one-fifth of an inch.

"Under stones, old wood, etc., in moist situations near Savannah, Georgia."—SAY.[a]

PHILOSCIA NIGRICANS Budde-Lund.

Philoscia nigricans BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 210–211.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 305; Proc. U. S. Nat. Mus., XXIII, 1901, p. 565.

Locality.—Biloxi, Mississippi.

Body oblong-oval, rather convex, smooth, slightly covered with a few dots.

Second pair of antennæ lost in the specimen.

Frontal margin straight; epistome with a median transverse line.

Abdomen abruptly narrower than the thorax; epimera distant. The last segment of the abdomen short, subtriangular, with the sides straight or slightly incurved; apex obtuse, sulcate above.

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[a] Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 429–430.

Color dark brown, covered with numerous white spots or little stripes. Legs yellow, with the coxæ spotted with black.

Length, 9 mm.; width, 4 mm.; height, 1.6 mm.[a]

108. Genus CYLISTICUS Schnitzler.[b]

Body oblong, very convex, contractile into a ball.

Head with lateral lobes distinct; median lobe small; front of head marginate. Eyes distinct, lateral. Second pair of antennæ long; flagellum composed of two subequal articles.

Lateral parts of the thoracic segments large.

Abdomen not abruptly narrower than thorax; lateral parts of third, fourth, and fifth segments well developed; terminal segment conically produced.

Opercular plates of all the pleopods furnished with tracheæ.

Inner branch of the uropoda inserted far in front of the outer branch, near the inner antero-lateral angle of the peduncle.

CYLISTICUS CONVEXUS (De Geer).

Oniscus convexus De Geer, Mém. des Insectes, VII, 1778, p. 553, pl. xxxv, fig. 11.

Porcellio spinifrons Brandt, Bull. de la Soc. Imp. d. Naturalistes de Moscou, VI, 1833, p. 15.

Porcellio lævis Koch, Deutschlands Crustaceen, 1835–1844, p. 6.

Porcellio armadilloides Lereboullet, Mém. de la Soc. du Muséum d'Histoire Nat. de Strasbourg, IV, 1853, p. 65, pl. i, fig. 18; pl. iii, figs. 88–94.

Cylisticus lævis Schnitzler, De Oniscineis agri Bonnensis, 1853, p. 25.

Porcellio armadilloides Kinahan, Nat. Hist. Rev., IV, 1857, p. 279.

Porcellio convexus Johnson, Academisk Afhandling, Upsala, 1858, p. 32.

Porcellio armadilloides Bate and Westwood, Brit. Sessile-eyed Crust., II, 1868, p. 485.

Porcellio convexus Budde-Lund, Nat. Tidsskr. (3), VII, 1870–71, p. 240.—Stuxberg, Öfvers. af Kgl. Vetenskaps Akad. Förh., 1875, p. 60.

Cylisticus convexus Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 77–79. (See Budde-Lund for further synonymy.)—G. O. Sars, Crust. of Norway, II, 1899, p. 186, pls. xi, xii.—Richardson, Amer. Nat., XXXIV, 1900, p. 303; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 565–566.—Stoller, 54th Report New York State Museum, 1902, p. 213.—Paulmier, Bull. New York State Museum, 1905, pp. 181–182.

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[a] The above description is adapted from the following one of Budde-Lund's:

Oblonge ovalis, convexiuscula, nitida, tenuiter et sparse punctata.

Antennæ exteriores . . .

Linea marginalis frontalis recta; epistoma medio linea transversa.

Cauda trunco abrupte angustior; epimera subdistantia. Annulus analis brevis, subtriangulus, lateribus subrectis vel leviter incurvis, apice obtuso, supra sulcatus.

Color ex nigro brunneus, maculis vel striolis numerosis albidis conspersus. Pedes flavi, coxis nigromaculatis.

Longitudo, 9 mm.; latitudo, 4 mm.; altitudo, 1.6 mm.—Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 210–211.

[b] For characters of genus see Budde-L [illegible] stria, 1885, p. 77, and Sars, Crust. of Norway, II, 1899, p [illegible]

Localities.—Westwood, Hamilton County, Ohio; "Old Mill," Devils Backbone, Hamilton County, Ohio; Miami Grove, Ohio; Piseco, New York; Rock Island, Illinois; Springfield, Ohio; Columbus, Ohio; Clifton, Cincinnati, Ohio; Washington, District of Columbia; New York City; Norwich, New York; Warwick, Massachusetts; Kelley's Island, Lake Erie; Syracuse, New York; Las Vegas Hot Springs, New Mexico; Saginaw, Michigan; also Sweden; Denmark; British Isles; Germany; Bohemia; Holland; Belgium; France; Turkey; and coast of Norway.

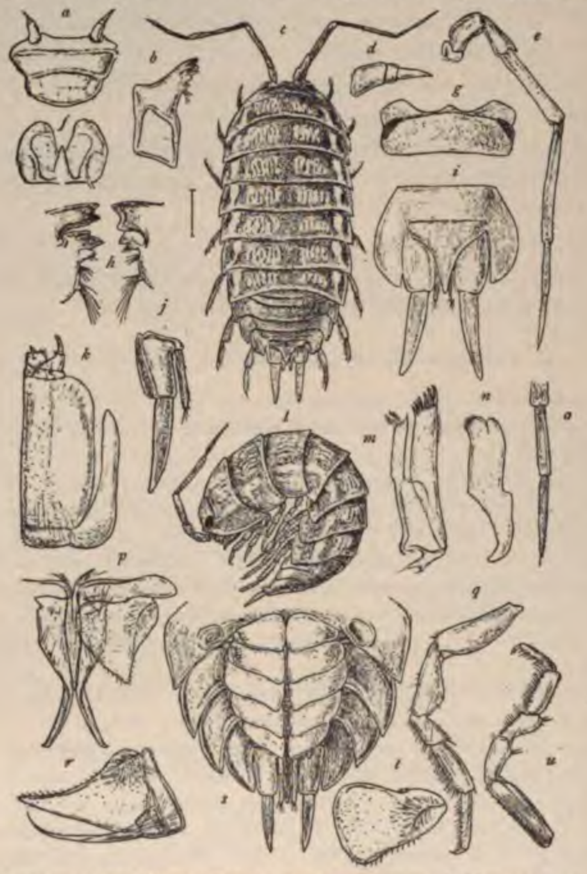

Fig. 665.—Cylisticus convexus (after Sars). *a*, Anterior lip. *b*, Mandible. *c*, Dorsal view of male. *d*, First antenna. *e*, Second antenna. *f*, Posterior lip. *g*, Head (dorsal view). *h*, Mandibles. *i*, Last two segments of abdomen and uropoda. *j*, Uropod. *k*, Maxillipeds. *l*, Lateral view of male. *m*, First maxilla. *n*, Second maxilla. *o*, Flagellum of second antenna. *p*, First pleopod of male. *q*, Seventh leg. *r*, Second pleopod of male. *s*, Abdomen (ventral view). *t*, First pleopod of female. *u*, First leg.

Found under bricks and boards; in woods, under logs; along roads, under stones; in wood sheds.

Body oblong-ovate, contractile into a ball, a little more than twice as long as wide, 5½ mm. : 12½ mm.

Head about twice as wide as long, 1½ mm. : 3 mm., with the anterior

three lobes, the median lobe being small and tri-
acute, the lateral lobes being large and widely
s are small and composite and situated at the base
al lobes. The first pair of antennæ are small and
he second pair have the first article short; the sec-
g as the first; the third is equal in length to the sec-
s twice as long as the third; the fifth is one and a
than the fourth. The flagellum is composed of two
. The second antennæ extend to the posterior margin
racic segment.

f the thorax are about equal in length. The epimera
om the segments. The lateral margins are straight.
l angles of the first segment are produced forward to
d, and they extend to the base of the antero-lateral
d; the post-lateral angles of the first segment are pro-
d in acute processes.

ments of the abdomen are distinct. The first two have
arts covered by the seventh thoracic segment. The third,
fifth segments have the lateral parts produced to continue
utline of the body. The sixth or terminal segment is tri-
ith the apex produced in a long acutely terminating process.
ment is 2 mm. wide at the base and 2 mm. long to the end of
ical process. The basal article or peduncle of the uropoda
ds just a little beyond the middle of the apical process of the
inal abdominal segment. The inner branch is 1 mm. long, and
xtends to the tip of the terminal abdominal segment. The outer
branch is 1 mm. in length and extends a little more than half its length beyond the extremity of the abdomen.

All the legs are ambulatory in character.

In color it is a light brown with a longitudinal row of yellow spots on either side at the place of union of the epimera with the segments. Between the median line and the longitudinal rows are markings of yellow wavy lines.

109. Genus PORCELLIO Latreille.[a]

Body oval, more or less depressed, very little contractile. Lateral parts of the thorax expanded.

Head with the antero-lateral lobes well developed; median frontal lobe more or less prominent. Front of head marginate. Eyes generally well developed, dorsally placed. Second pair of antennæ long; flagellum composed of two articles, the first usually longer than the second, often equally long or even a little shorter.

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[a] See Budde-Lund for characters of genus, Crust. Isop. Terrestria, 1885, pp. 82–83, and Sars, Crust. of Norway, II, 1899, p. 176.

Abdomen not abruptly narrower than thorax; lateral parts of third, fourth, and fifth segments well developed; terminal segment conically produced.

Opercular plates of the first two pairs of pleopoda and sometimes of all five pairs furnished with tracheæ. Inner branch of the uropoda inserted far in front of the outer branch near the inner antero-lateral angle of the peduncle.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS PORCELLIO.

- *a.* Surface of body smooth or minutely granular.
  - *b.* Second pair of antennæ long, equal to half the length of the body. Flagellum with the first article not shorter than the second.
    - *c.* Articles of flagellum subequal. Middle frontal lobe of head rounded; lateral lobes roundly truncate. Color, dark grayish red with numerous pale, irregular oblong spots intermixed, arranged in two wide series separated by a small interval ....*Porcellio formosus* Stuxberg.
    - *c′.* First article of flagellum of second antennæ longer than the second. Middle frontal lobe of head acutely produced; lateral lobes rounded. Color, dark gray, with two longitudinal bands of a lighter color in wavy stripes, one on either side of the median line ....*Porcellio lævis* Latreille.
  - *b′.* Second pair of antennæ short, equal to one-third the length of the body; flagellum with the first article one-third shorter than the second. *Porcellio parvicornis* Richardson.
- *a′.* Surface of body roughly granulate or tuberculate.
  - *b.* Inner face of the mandibles with four to five penicils. Body with spots.
    - *c.* Third joint of peduncle of second pair of antennæ furnished with a small apical tooth. Frontal lateral lobes of moderate size. Color varying from gray to black, with three longitudinal lines of white spots. Flagellum with joints subequal, or first shorter than second...............*Porcellio rathkei* Brandt
    - *c′.* Second joint of peduncle of second pair of antennæ furnished with a large apical tooth. Frontal lateral lobes large. Color, yellow; body spotted with black; spots arranged in longitudinal lines. Flagellum with first joint a little longer than second joint......................*Porcellio spinicornis* Say
  - *b′.* Inner face of right mandible with four to five penicils, of left mandible with seven to eight penicils. Frontal lateral lobes of head large, oblique. Body without spots.......................................*Porcellio scaber* Latreille

PORCELLIO FORMOSUS Stuxberg.

Porcellio formosus STUXBERG, Øfvers. Vet. Akad. Forh., 1875, No. 2, p. 57.—BUDDE-LUND, Crust. Isop. Terrestria, 1885, p. 141.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 362.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 862; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 329; American Naturalist, XXXIV, 1900, p. 304.

Localities.—San Francisco and San Pedro, California.

Body ovate, almost half as wide as long, convex, smooth, shining.

Second pair of antennæ equal in length to the width of the body; the first article of the peduncle is half as long as the second, the fourth has a longitudinal excavation, deep on the outside, light above, the fifth is the longest, longer than the preceding by a third part, not much longer than the flagellum, straight, the proximal part inconspicuously, the distal part lightly channeled; the articles of the flagellum subequal. Eyes oval, prominent, with numerous ocelli.

The median frontal lobe is a little produced, rounded, the lateral lobes drawn out, equal in length to the width of the face or to the eyes, anteriorly roundly truncate, provided behind with a deep semilunar excavation.

The first three segments of the thorax with the posterior margin straight, the posterior angles of the epimera straight, the fourth segment with the posterior angles of the epimera straight, those of the fifth, sixth, and seventh segments more and more bent backward, but not very acuminate.

The abdomen is semicircular, about a fifth part wider than long, the epimera of the third, fourth and fifth segments moderately large, bent backward, curved on the inner margin, twice as long as wide and a little acuminate. The last segment is triangular, almost as wide as long, deeply sinuated on the posterior margins, the apex wide, roundly acuminate, with a deep and wide longitudinal excavation above. The basal article of the uropoda seen from below is as wide as long, convex above; the outer branch is subdepressed, lanceolate, with the inner margin straight, the outer margin curved, its greatest width equal to a fourth part of the length; the inner branch is slender and a third part shorter than the outer branch. The color of the dorsal surface is a dark grayish red with numerous pale, irregular, oblong spots intermixed arranged in two wide series separated by a small interval. The abdomen is generally of one color, with the last segment bi- or tri-punctate at the base.

It varies in having a longitudinal band of grayish white and a lateral series of large spots of the same color.

Length 13 mm., width 6 mm.; length of the second antennæ 6 mm.[a]

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[a] The above description is adapted from the following one of Stuxberg's:

Porcellio ovalis, latitudine dimidiam longitudinem prope assequente (latitud. ad longitud. = 45 : 100), convexus, sublævis, subnitidus.

Antennæ exteriores latitudinem corporis longitudine æquantes; pedunculi articulus primus secundo duplo brevior, quartus extra profundius, supra levius longitudinaliter sulcatus, quintus longissimus, præcedente tertia parte, flagello haud multo longior, rectus, parte proximali inconspicue, distali levius canaliculata; flagelli articuli inter se eadem longitudine. Oculi, ocellis congregatis prominentes, ovales.

Lobus frontalis medius paullum productus, rotundatus, laterales evoluti, longitudine altitudine faciei vel oculis æquales, antice truncato-rotundati, pone excavatione semilunari profundiore præditi.

Trunci segmenta tria priora margine postico recto, epimerorum angulis posticis rectis, quartum subrectis, quintum, sextum, septimum magis magisque retroflexis, sed non multum acuminatis.

Cauda subcircularis, latitudine quinta circiter parte majore quam longitudine, epimeris segmentorum tertii, quarti, quinti mediocribus, retroversis, margine interiore curvatis, duplo longioribus quam latioribus, paullum acuminatis. Segmentum ultimum trigonum, prope æque longum ac latum, marginibus posticis profunde sinuatum, apice lato, rotundate acuminato, supra late et profunde longitudinaliter exca-

PORCELLIO LÆVIS Latreille.

Porcellio lævis LATREILLE, Hist. Nat. des Crust. et Insectes, VII, 1804, p. 46; Genera Crustaceorum et Insectorum, I, 1806, p. 71.—LEACH, Edinb. Encycl., VII, 1813–14, p. 406; Trans. Linn. Soc. London, XI, 1815, p. 375.

Oniscus lævis LAMARCK, Hist. Nat. des animaux sans Vertèbres, V, 1818, p. 154.

Porcellio degeerii AUDOUIN and SAVIGNY, Descript. de l'Egypte, 1826, p. 289, pl. XIII, fig. 5.

Porcellio eucercus BRANDT, Bull. Soc. Imp. d. Moscou, VI, 1833, p. 177.—MILNE EDWARDS, Hist. Nat. des Crust., III, 1840, p. 168.

Porcellio syriacus BRANDT, Bull. Soc. Imp. d. Moscou, VI, 1833, p. 178.—MILNE EDWARDS, Hist. Nat. des Crust., III, 1840, p. 170.

Porcellio cinerascens BRANDT, Bull. Soc. Imp. d. Moscou, VI, 1833, p. 178.

Porcellio dubius BRANDT, Bull. Soc. Imp. d. Moscou, VI, 1833, p. 178.—MILNE EDWARDS, Hist. Nat. des Crust., III, 1840, p. 170.

Porcellio poeyi GUÉRIN, Comptes Rendus, 1837, p. 132.

Porcellio lævis MILNE EDWARDS, Hist. Nat. des Crust., III, 1840, p. 169.

Porcellio urbicus KOCH, Deutsch. Crust., 1835–1844, p. 36.

Porcellio ovatus ZADDACH, Synops. Crust Pruss. prodromus, 1844, p. 13.

Porcellio degeerii LUCAS, Expl. d'Alg., I, 1849, pp. 69, 139.

Porcellio lævis LEREBOULLET, Mém. de la Soc. de Strasbourg, IV, 1853, p. 45, pl. I, fig. 7; pl. III, figs. 55–60.

Porcellio cubensis SAUSSURE, Mém. Soc. phys. Genève, XIV, 1858, p. 477, pl. V, fig. 35.

Porcellio sumichrasti SAUSSURE, Mém. Soc. phys. Genève, XIV, 1858, p. 478, pl. V, fig. 36.

Porcellio cotillæ SAUSSURE, Mém. Soc. phys. Genève, XIV, 1858, p. 478, pl. V, fig. 37.

Porcellio mexicanus SAUSSURE, Mém. Soc. phys. Genève, XIV, 1858, p. 479, pl. V, figs. 39, 40.

Porcellio aztecus SAUSSURE, Mém. Soc. phys. Genève, XIV, 1858, p. 479, pl. V, fig. 38.

Porcellio lævis BUDDE-LUND, Nat. Tidsskrift., 3d ser., VII, 1870, p. 236.

Porcellio aztecus MIERS, Proc. Zool. Soc. Lond., 1877, p. 669.

Porcellio lævis BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 138–141 (see Budde-Lund for further synonymy); Entom. Meddelel., IV, 1893-94, p. 118.—SARS, Crust. of Norway, II, 1899, pp. 181–182, pl. LXXIX, fig. 2.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 862–863; Amer. Nat., XXXIV, 1900, p. 304; Proc. U. S. Nat. Mus., XXI, 1901, pp. 566–569.

Localities.—Oakland, California; Cincinnati, Ohio; Raymond, California; San Francisco Bay, California; San Antonio, Texas; St. Marys, Georgia; New Providence, Bahamas; Washington, District of Columbia; Hamilton, Bermudas; Colfax, California; Las Cruces, New Mexico; Unalaska; Key West, Florida; Monterey Bay, California;

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vato. Pedum ultimi paris articulus basalis infra visus eadem latitudine ac longitudine, supra convexus; appendix exterior subdepressa, lanceolata, margine interiore subrecto, exteriore curvato, latitudine maxima quartam longitudinis partem æquante; appendix interior teres, exteriore tertia parte brevior.

Color dorsi ex rufo fusco-griseus, immixtis maculis pallidioribus oblongis irregularibus numerosis, in duas series latas parvo intervallo distantes digestis. Cauda plerumque unicolor segmento ultimo ad basin bi- (vel tri-) punctato.

Variat vitta longitudinali albo-grisea serieque macularum majorum ejusdem coloris laterali.

Longitudo 13 mm., latitudo 6 mm.; longitudo antennarum exteriorum 6 mm.—STUXBERG, Øfvers. Vet. Akad. Forh., 1875, No. 2, p. 57.

Esenada, Lower California; Mesilla Park, New Mexico; Phoenix, Arizona; Las Vegas, New Mexico; Cabãnas, Cuba; warm spring, a few miles west of Socorro, New Mexico; Azores; Galapagos Islands; Alabaster Cave, Eldorado County, California; Alvarez, Mexico, at an altitude of 8,000 feet; Oahu, Hawaiian Islands; Honolulu, Hawaiian Islands; Carácas, Venezuela; world-wide in distribution.

This species is said to be injurious to various plants in Fort Worth, Texas; found at roots of sugar beets; under stones; in cellars. It has also been found dead near poisoned cotton, showing that it feeds on the growing cotton plants.

Body oblong-ovate, almost twice as long as wide, 8 mm. : 15 mm.

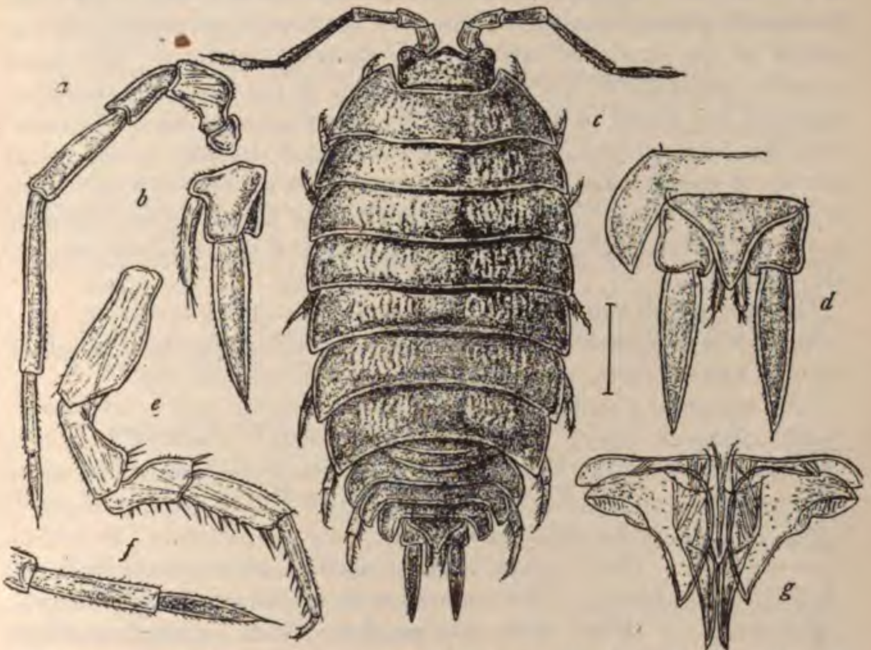


Fig. 666.—Porcellio lævis (After Sars). *a*, Second antenna. *b*, Uropod. *c*, Adult male. *d*, Last two segments of abdomen amd uropods. *e*, Seventh leg. *f*, Flagellum. *g*, First pleopods of male.

Head wider than long, 2 mm. : 3½ mm., with the anterior margin produced in three lobes, the median lobe being triangulate, the lateral lobes rounded and larger than the median lobe. The eyes are small, composite, and situated at the base of the antero-lateral lobes. The first pair of antennæ are small and inconspicuous, and are composed of two articles. The second pair of antennæ have the first article short; the second article is one and a half times longer than the first; the third is as long as the second; the fourth is nearly twice as long as the third; the fifth is one and a half times as long as the fourth. The flagellum is composed of two articles, the first of which is a little longer ın the second. The second pair of antennæ extend to the middle of e third thoracic segment.

The segments of the thorax are subequal, the first one having the ntero-lateral angles produced so as to surround the head and extendng as far as the base of the antero-lateral lobes. The epimera are perfectly united with the segments.

All six segments of the abdomen are distinct, the first two having the lateral parts concealed by the seventh thoracic segment. The lateral parts of the third, fourth, and fifth segments are produced to continue the oval outline of the body. The sixth, or terminal, segment is 2½ mm. wide at the base, is triangulate, with apex produced in a long, narrow process. The sixth segment is 2 mm. long from the base to the extremity. There is a shallow groove extending the length of the produced apex of the terminal segment. The basal article or peduncle of the uropoda extends to the tip of the posterior angles of the lateral parts of the fifth abdominal segment. The inner branch is 1½ mm. long, and is partly concealed dorsally by the apical process of the terminal abdominal segment, but extends half its length beyond this process. The outer branch is 2½ mm. long, and extends almost its entire length beyond the extremity of the terminal abdominal segment.

The legs are all ambulatory in character and spinulose.

In color it is a dark gray, with two longitudinal bands of a lighter color in wavy stripes, one on either side of the median line.

PORCELLIO PARVICORNIS Richardson.

Porcellio parvicornis RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, p. 302, pl. XL, fig. 57.

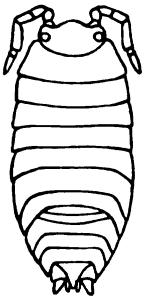


FIG. 667.—PORCELLIO PARVICORNIS.

Locality.—Bermudas.

Body ovate, surface marked with minute granulations. Color yellow, with markings of light brown.

Head with median lobe small, widely rounded. Lateral lobes small, rounded. Eyes distinct, and situated on the lateral lobes of the head. Exterior antennæ short, about one-third the length of the body; flagellum two-jointed, first joint very much shorter than second joint, about one-third shorter.

Thoracic segments subequal, with the exception of the first, which is a little longer than any of the others.

First two abdominal segments with lateral parts hidden by the preceding thoracic segment. Three following segments with lateral parts expanded, the margins continuing the oval outline of the body. Terminal segment triangular, with sides somewhat incurved and rounded at the apex. Basal joint of uropoda reaching a little more than half the length of the last abdominal segment. Inner branch extends a short distance beyond the terminal segment of the body; outer branch extends but very little beyond the inner branch.

One specimen was collected by Prof. A. E. Verrill at the Bermudas in 1901.

Type specimen in Peabody Museum, Yale University. Cat. No. 3353.

PORCELLIO RATHKEI Brandt.

Porcellio rathkei BRANDT, Bull. de la soc. Imp. d. Naturalistes de Moscou, VI, 1833, p. 15.—MILNE EDWARDS, Hist. Nat. des Crust., III, 1840, p. 170.

Porcellio ferrugineus BRANDT, Bull. de la soc. Imp. d. Naturalistes de Moscou, VI, 1833, p. 16.—MILNE EDWARDS, Hist. Nat. des Crust., III, 1840, p. 170.

Porcellio trilineatus KOCH, Deutschl. Crust., 1835–1844, p. 34.

Porcellio trivittatus LEREBOULLET, Mém. de la Soc. de muséum nat. de Strasbourg, IV, 1853, p. 54, pl. I, figs. 13, 14; pl. III, figs. 66–70.

Porcellio tetramoerus SCHNITZLER, De Oniscineis agri. Bonnensis, 1853, p. 24.

Porcellio striatus SCHNITZLER, De Oniscineis agri. Bonnensis, 1853, p. 24.

Porcellio trilineatus SILL, Verhandl. u. Mittheilungen des Siebenbürgischen Vereins für Naturwissenschaften zu Hermannstadt, XIII, 1862, p. 26.

Porcellio trivittatus JOHNSON, Academisk Afhandling, Upsala, 1858, p. 25.

Porcellio trilineatus BUDDE-LUND, Nat. Tidsskr. (3), VII, 1870, p. 239.—STÜXBERG, Öfvers. af Kgl. Vetenskaps Akad. Forh., 1875, p. 59.

Porcellio rathkei BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 85–87. (See Budde-Lund for synonymy).—SARS, Crust. of Norway, II, 1899, pp. 180–181, pl. LXXIX, fig. 1.—RICHARDSON, Amer. Nat., XXXIV, 1900, p. 304; Proc. U. S. Nat. Mus., XXIII, 1900, p. 567.—PAULMIER, Bull. New York State Museum, 1905, pp. 182–183.

Localities.—Springfield, Ohio; Lockland, Ohio; Columbus, Ohio; Clifton, Cincinnati, Ohio; Chaumont, New York; Syracuse, New York; St. Marys, Georgia; Salem and Beverly, Massachusetts; Lake Champlain; New York City; Lawrence, Massachusetts; Washington, District of Columbia; Saginaw, Michigan; Freeport, Maine; Victoria, Texas; Providence, Rhode Island; also Europe.

Found in woodsheds, greenhouses, on rotten logs, under brick and boards, under logs, at river bottom.

Body oblong-ovate, a little more than twice as long as wide, 5 mm.: 10½ mm.

Head about twice as wide as long, 1 mm.: 2 mm., with the anterior margin produced in three lobes, the median one being less produced than the lateral lobes and all having rounded extremities. The eyes are small, composite, and situated at the base of the antero-lateral lobes. The first pair of antennæ are small and inconspicuous and are composed of only two articles. The second pair of antennæ have the first article short; the second about one and a half times as long as the first; the third equal in length to the second; the fourth twice as long as the third; the fifth one and a half times as long as the fourth. The flagellum is composed of two subequal articles. The second antennæ extend to the posterior margin of the third thoracic segment.

The segments of the thorax are subequal in length. The first one has the antero-lateral angles produced to surround the head, and they extend almost to the base of the antero-lateral angles of the head. The epimera are perfectly united with the segments. The lateral margins are straight.

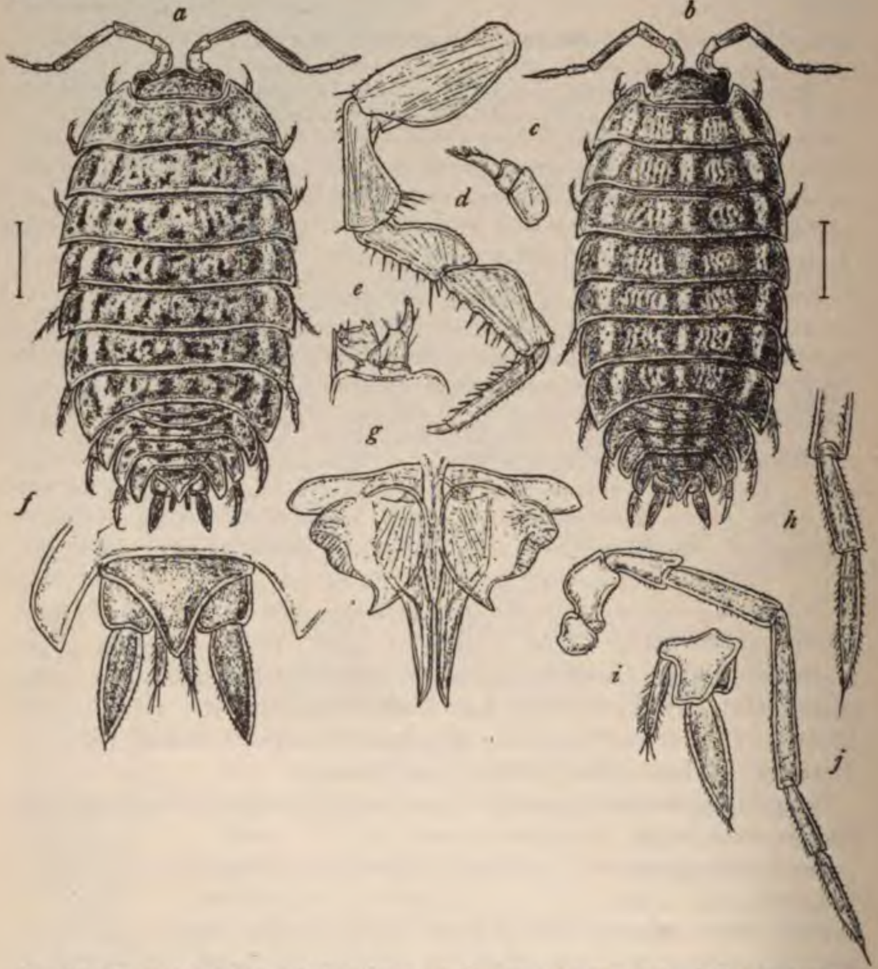


FIG. 668.—PORCELLIO RATHKEI (AFTER SARS). *a*, DORSAL VIEW OF MALE. *b*, DORSAL VIEW OF FEMALE. *c*, FIRST ANTENNA. *d*, SEVENTH LEG. *e*, MAXILLIPED. *f*, LAST SEGMENT OF ABDOMEN AND UROPODA. *g*, FIRST PLEOPOD OF MALE. *h*, FLAGELLUM. *i*, UROPOD. *j*, SECOND ANTENNA.

All six segments of the abdomen are distinct, the first two having the lateral parts covered by the seventh thoracic segment. The third, fourth, and fifth segments have the lateral parts produced so as to continue the oval outline of the body. The sixth or terminal segment is triangular with apex produced in a long, narrow process. The length of the segment from the base to the extremity of the apex is equal to the base, 1 mm.: 1 mm. The peduncle or basal article of the uropoda extends almost to the extremity of the posterior angle of the lateral part of the fifth abdominal segment, which is a little shorter than the tip of the apical process of the sixth segment. The inner branch is 1 mm. long and is partly concealed by the apical process of the sixth abdominal segment; it extends to the middle of the outer branch. The outer branch is 1 mm. long, and extends about two-thirds of its length beyond the apical process of the sixth abdominal segment.

All the legs are ambulatory in structure.

In color it is a dark brown with three longitudinal lines of light yellow, one median and one on either side at the place of union of the epimera with the segments. Between the median line of light yellow and the lateral lines are wavy lines of light yellow on the brown color, giving it a broken, mottled effect.

The surface of the body is covered with low granules.

PORCELLIO SPINICORNIS Say.

Porcellio spinicornis SAY, Jour. Ac. Nat. Sci. Phila., I, 1818, pp. 431, 432.

Porcellio pictus BRANDT and RATZEBURG, Med. Zool., II, 1830–1834, p. 78, pl. XII, figs. 5, 5e, 5f.

Porcellio melanocephalus KOCH, Deutschl. Crust., 1835–1844, p. 28.

(?) *Porcellio spinicornis* DE KAY, Zool. New York, Pt. 6, 1844, p. 51.

Porcellio mixtus FITCH, Rep. noxious ins., 1856, p. 120.

Porcellio pictus KINAHAN, Nat. Hist. rev., IV, 1857, p. 278.—BATE and WESTWOOD, Brit. Sess. Crust., II, 1868, p. 480.—BUDDE-LUND, Nat. Tidsskr. (3), VII, 1870, p. 239; Crust. Isop. Terrestria, 1885, pp. 123–125.—G. O. SARS, Crust. of Norway, II, 1899, pp. 177, 178, pl. LXXVIII, fig. 1.—STOLLER, 54th Report New York State Museum, 1902, p. 213.

Localities.—North America, at New York; Niagara; Goshen, Connecticut; also Sweden; Denmark; Germany; Britain; France; Hungary; Russia; coast of Norway.

Found in the crevices of rocks and on shady limestone ledges. (STOLLER.)

Body nearly twice as long as wide, 7 mm. : 13 mm.

Head twice as wide as long, 1½ mm. : 3 mm., with the front produced in three lobes, the antero-lateral lobes being large and rounded, the median lobe wide but short and almost truncate on its anterior margin. The eyes are small, oval, composite, and situated at the base of the antero-lateral lobes. The first pair of antennæ are rudimentary and inconspicuous. The basal article of the second pair of antennæ is short; the second and third are subequal and each is twice as long as the first; the fourth is one and a half times as long as the third; the fifth is one and a half times longer than the fourth. The flagellum is composed of two articles, the first of which is one and a half times longer than the second. The second antennæ extend to the posterior margin of the third thoracic segment. The second article of the second antenna has the inner margin expanded into a spine-like process, which is very conspicuous. The maxillipeds have a palp of three articles. The palp of the mandibles is wanting.

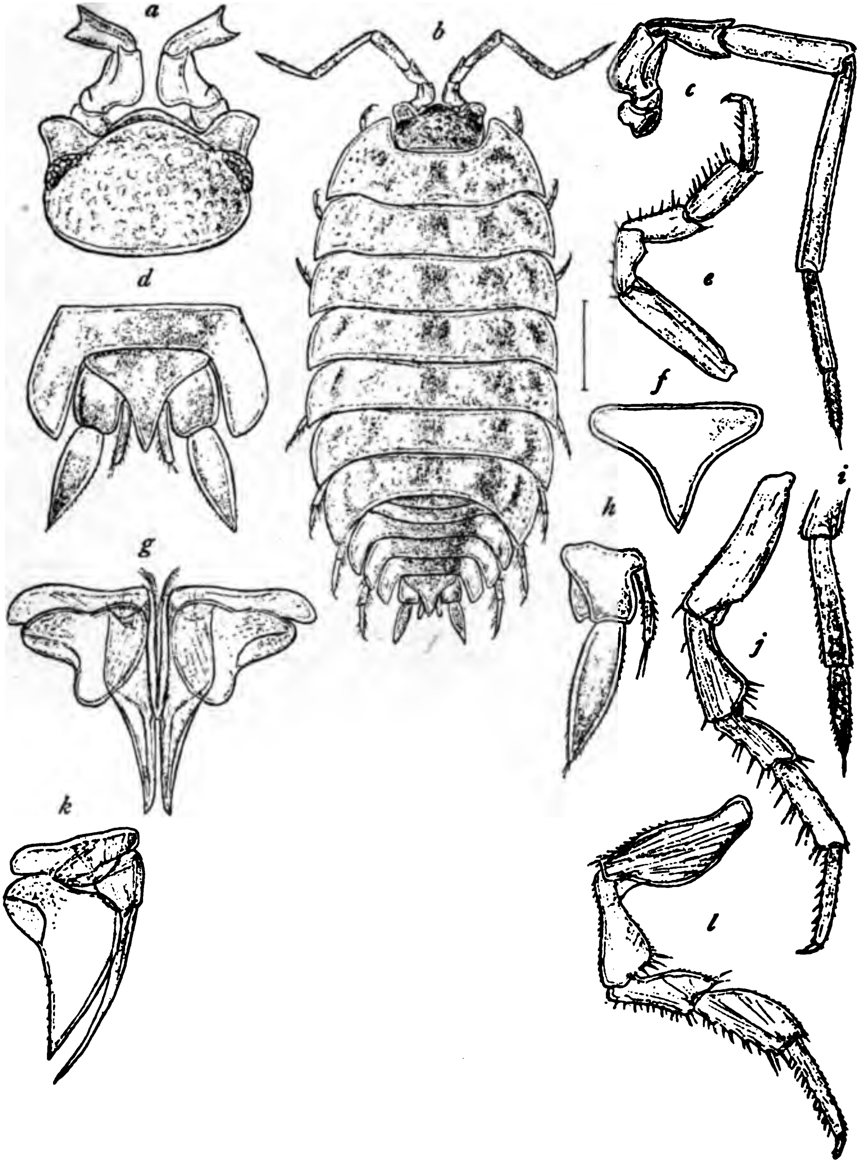
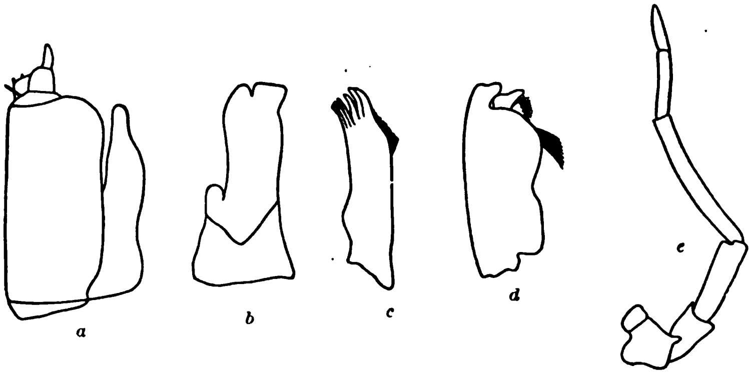


FIG. 669.—PORCELLIO SPINICORNIS (AFTER SARS). *a*, HEAD. *b*, DORSAL VIEW OF FEMALE. *c*, SECOND ANTENNA. *d*, LAST TWO SEGMENTS OF ABDOMEN AND UROPODA. *e*, FIRST LEG OF FEMALE. *f*, LAST SEGMENT OF ABDOMEN. *g*, FIRST PLEOPOD OF MALE. *h*, UROPOD. *i*, FLAGELLUM. *j*, SEVENTH LEG OF FEMALE. *k*, SECOND PLEOPOD OF MALE. *l*, SEVENTH LEG OF MALE.

The first segment of the thorax is 2 mm. in length, a little longer than any of the others, which are subequal and each is 1½ mm. in length. The epimera are not separated off from the segments.

The abdomen is as wide as the thorax. The first two segments have he lateral parts covered by the last thoracic segment. The sixth or erminal segment is triangular, with apex produced to a long, narrow rocess rounded at the extremity. The terminal segment is 2 mm. vide at the base and 1½ mm. long. The peduncle of the uropoda



IG. 670.—Porcellio spinicornis. a, Maxilliped. × 33. b, Second maxilla. × 33. c, First maxilla (outer lobe). d, Mandible. × 33. e, Second antenna.

xtends almost to the extremity of the terminal segment of the body. he inner branch extends a very short distance beyond the terminal bdominal segment. The outer branch is about twice as long as the eduncle. The whole surface of the body is closely covered with mall tubercles.

All the legs are ambulatory.

PORCELLIO SCABER Latreille.

Porcellio scaber Latreille, Hist. Crust. Ins., VII, 1804, p. 45; Gen. Crust., I, 1806, p. 70.—Leach, Edinb. Encycl., VII, 1814, p. 406.—Risso, Crust. de Nice, 1816, p. 155.

Oniscus granulatus Lamarck, Hist. Nat. des animaux sans vertèbres, V, 1818, p. 154.

Porcellio nigra Say, Journ. Phil. Acad. Nat. Sci., I, 1818, p. 432.

Porcellio granulatus Brébisson, Mém. Soc. Calv., 1825, p. 261.

Porcellio scaber Desmarest, Consid. Crust., 1825, p. 321.—Brandt and Ratzeburg, Med. Zool., II, 1830–1834, p. 77, pl. xii, figs. 1–4 and A–B.—Brandt, Bull. Soc. Imp. de. Naturalistes de Moscou, VI, 1833, p. 14.

Porcellio brandtii Milne Edwards, Hist. Nat. des. Crust., III, 1840, p. 168.

Porcellio granulatus Milne Edwards, Hist. Nat. des Crust., III, 1840, p. 169, pl. xxxii, fig. 21.

Porcellio scaber Milne Edwards, Cuvier Rg. An., 1849, pl. lxxi–lxxi *bis*.

Porcellio nigra Gould, Rep. Invert. Mass., 1841, p. 337.

Porcellio scaber Koch, Deutschlands Crust., 1835–1844, p. 34.

Porcellio dubius Koch, Deutschlands Crust., 1835–1844, p. 34.

Porcellio scaber Lereboullet, Mém. Strasb., IV, 1853, p. 34, pl. i, figs. 4, 5; pl. ii, figs. 43–47.

Porcellio gemmulatus Dana, Crust. U. S. Expl. Exp., XIV, 1853, p. 725, pl. xlvii, fig. 7.—Stimpson, Bost. Journ. Nat. Hist., VI, 1850–1857, p. 506.

Philoscia tuberculata Stimpson, Proc. Cal. Acad. Sci., I, p. 1856, p. 97.

Porcellio montezumæ Saussure, Mém. Soc. Phys. Hist. Nat. Genève, XIV, 1858, Pt. 2, p. 480, pl. v, figs. 41–41 *bis*.

Porcellio scaber Bate and Westwood, Brit. Sess.-eyed, Crust., II, 1868, p. 475.

Porcellio paulenses Heller, Novara Exp., 1868, p. 136, pl. xii, fig. 5.

Porcellio scaber Plateau, Bull. Acad. r. Belgique, 2d ser., XXIX, 1870, No. 2, p. 8.—E. Brandt, Horæ Soc. Ent. Rossi, VIII, 1870, p. 167.—Budde-Lund, Nat. Tidsskrift., 3d ser., VII, 1870, p. 238; Crust. Isop. Terrestria, 1885, pp. 129–131.—Sars, Crustacea of Norway, II, 1899, pp. 176–177, pl. lxxvii.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 863; Amer. Nat., XXXIV, 1900, p. 304; Proc. U. S. Nat. Mus., XXIII, 1901, p. 567.—Chilton, Trans. Linn. Soc. Lond., (2), VIII, 1901, Pt. 4, p. 139.—Stoller, 54th Report New York State Museum, 1902, p. 213.—Paulmier, Bull. New York State Museum, 1905, p. 183.

Localities.—Comax, British Columbia, near Union Wharf, along the shore; Taylor Bay, Gabriola Island, British Columbia, on the shore; San Diego, California; Puget Sound; Oakland, California; Norwood, Ohio; Westwood, Cincinnati, Ohio; Andersons Ferry, Hamilton County, Ohio; Springfield, Ohio; Bering Island; Woods Hole, Massachusetts; Colfax, California; Ocean Grove, New Jersey; Westfield, New York; Magdalen Islands; Victoria, Vancouver Island; Salem, Massachusetts; Northfield, Cook County, Illinois; Beverly, Massachusetts; Hamilton and Warwick, Massachusetts; Crescent City, California; Gulf of Georgia; Britain Island, Nova Scotia; Penikese Island, Massachusetts; Key West, Florida; San Mateo, California; the Bermudas; New York City; West Haven, Connecticut; Bloomington, Illinois; Lawrence, Massachusetts; Woodside, Maryland; Grand Menan, New Brunswick; Saginaw, Michigan; Lagonistas Creek, California; Lake Maxinkuckee, Indiana; Freeport, Maine; Greenland; Newfoundland; New York; Niagara, New York; San Francisco, California; San Pedro, California; St. Paul Island; St. Croix; Ascension Island; Kamchatka; Iceland; Hawaii; Cape of Good Hope; all Europe; distribution world-wide.

Found under dead leaves and stumps, under brick and boards; along the shore; in greenhouses.

Body ovate, not capable of being rolled up into a ball, and less than twice as long as wide, 6 mm. : 10 mm.

Head twice as wide as long, 2 mm. : 1 mm., with the anterior margin produced in three lobes, one median and two lateral lobes. The median lobe is triangular, with apex obtuse; the lateral lobes are rounded and large and extend as far as the median lobe. The eyes are small, round, and composite, and are situated at the base of the antero-lateral expansions. The first pair of antennæ are rudimentary and inconspicuous and are composed of three articles. The second pair of antennæ have the basal article short; the second is about one and a half times as long as the first; the third is as long as the second; the fourth is nearly twice as long as the third; the fifth is nearly twice as long as the fourth. The flagellum is composed of two unequal articles, the first one being the shorter. The second antennæ extend to the middle of the third thoracic segment. The maxillipeds have a palp of three articles. The palp of the mandibles is wanting.

The segments of the thorax are subequal. There is no indication of epimera on any of the segments.

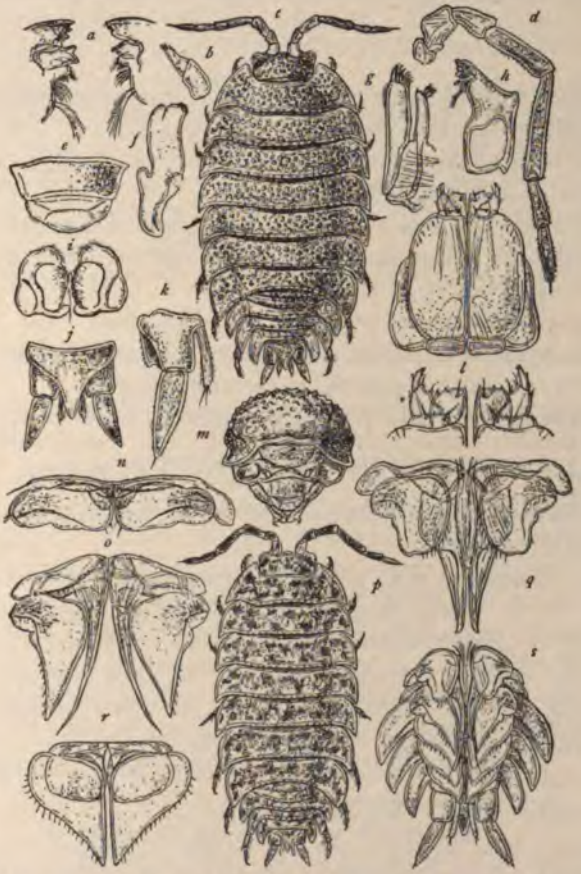


Fig. 671.—Porcellio scaber (After Sars). *a*, Mandibles. *b*, First antenna. *c*, Dorsal view of female. *d*, Second antenna. *e*, Anterior lip. *f*, Second maxilla. *g*, First maxilla. *h*, Mandible. *i*, Posterior lip. *j*, Last segment of abdomen and uropoda. *k*, Uropod. *l*, Maxillipeds. *m*, Head. *n*, First pleopod of female. *o*, Second pleopods of male. *p*, Var. marmorata (dorsal view of female). *q*, First pleopods of male. *r*, Third pleopod of male. *s*, Abdomen (ventral view).

The abdomen is as wide as the thorax. The first two segments are covered at the sides by the lateral parts of the seventh thoracic segment. The sixth or terminal segment is 1½ mm. wide at the base. It is triangularly produced to a long, narrow extremity, which is posteriorly rounded. The terminal segment is 1 mm. long. The uropoda are longer than the terminal segment. The outer branch extends ½ mm. beyond the extremity of the abdomen. The inner branch just reaches the tip of the last segment of the body.

All the legs are ambulatory.

The whole surface of the body is covered with small tubercles.

Color, generally a uniform gray black, sometimes lighter, variegated with irregular dark spots, occasionally black, with the lateral parts of the segments light yellow, forming a marginal border.

110. Genus LEPTOTRICHUS Budde-Lund.[a]

Body rather convex, scarcely contractile, generally setigerous.

Second pair of antennæ short, the first four articles of the peduncle subequal in length; flagellum composed of two articles, of which the first is much shorter than the second.

Front of head without a margin, produced in the middle with the epistome bulbous; antero-lateral processes obtuse. Vertical marginal line posteriorly wanting. Eyes small.

Lateral parts of thoracic segments not expanded.

Terminal segment of abdomen generally triangular; epimera of the third, fourth, and fifth segments moderately large.

First and second pairs of pleopoda furnished with tracheæ.

LEPTOTRICHUS GRANULATUS Richardson.

Leptotrichus granulatus Richardson, Trans. Conn. Acad. Sciences, XI, 1902, p. 303, pl. XL, fig. 58.

Locality.—Found in dead coral at Castle Harbor, Bermudas.

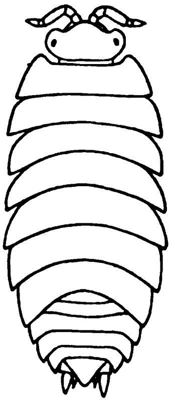


Fig. 672.—Leptotrichus granulatus. × 11⅔.

Body roughly and minutely granulated. Color light reddish or yellowish brown, with markings of dark brown in patches on each segment, forming four longitudinal rows, the two median rows not extending anteriorly beyond the third segment of the thorax in one specimen, and in the other being almost obsolete.

The head is produced in front in a prominent rounded median lobe, and at the sides in large rounded lateral lobes. The eyes are small, but distinct, and are placed at the base of the lateral lobes. The external antennæ are very short, not reaching the anterior angle of the first thoracic segment. The fourth joint of the peduncle is not longer than the third; the flagellum is composed of two joints, the first of which is about half the length of the second. The thoracic segments are subequal in length, the lateral parts broadly expanded.

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[a] See Budde-Lund for characters of genus, Crust. Isop. Terrestria, 1885, pp. 192–193.

The first two abdominal segments have the lateral parts undeveloped. The third, fourth, and fifth segments are broadly expanded laterally, the outer margins forming a continuous and unbroken line with the margins of the thoracic segments. The terminal segment of the abdomen extends but a distance of half its length beyond the lateral parts of the preceding segment; its surface is smooth. The basal joint of the uropoda attains half the length of the terminal segment. The inner branch reaches the apex of the last segment. The outer branch extends half its length beyond this.

Two specimens were collected by Prof. A. E. Verrill and party at the Bermudas in 1898. They were found in dead coral at Castle Harbor.

Type in Peabody Museum, Yale University. Cat. No. 3333.

This species can not be identified with any of the described species of the genus: *L. panzerii* (Audouin and Savigny), *L. tauricus* Budde-Lund, *L. squamatus* Budde-Lund, and *L.*[a] *lentus* (Budde-Lund), although it seems more closely related to the last named than to any of the former.

111. Genus METOPONORTHUS Budde-Lund.[b]

Body oblong, depressed, not convex, scarcely contractile.

Head marginate and with lateral lobes very small; frontal lobe wanting; vertical marginal line extending to the lateral lobes; second pair of antennæ long; flagellum composed of two articles, the first article generally longer than the second; abdomen abruptly narrower than the thorax, with the lateral parts of the third, fourth, and fifth segments small, appressed; terminal segment short, triangular, extending moderately beyond the lateral parts of the preceding segment; opercular plates of the first two pairs of pleopods furnished with tracheæ, rarely those of the third or of all the pairs furnished with tracheæ. Inner branch of the uropoda inserted far in front of outer branch, near the inner antero-lateral angle of the peduncle.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS METOPONORTHUS.[c]

a. Lateral parts of the third, fourth, and fifth segments of the abdomen well developed .... *Metoponorthus saussurei* Dollfus.
a′. Lateral parts of the third, fourth, and fifth segments of the thorax reduced, small.
  b. Epistome furnished with a sinuated transverse line.
    c. Second pair of antennæ equal to three-fifths the length of the body. First article of the flagellum much longer than the second. Inner face of right mandible furnished with four to five penicils, of the left with six penicils. Terminal segment of abdomen almost flat. Color brown or reddish brown, often mottled with white spots .... *Metoponorthus pruinosus* (Brandt).

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[a] See Dollfus, Mém. Soc. Zoöl. de France, 1896, pp. 542–543.

[b] For characters of genus see Budde-Lund, Crustacea Isopoda Terrestria, 1885, pp. 161–162, and Sars, Crust. of Norway, II, 1899, pp. 183–184.

[c] This key has been prepared entirely from the descriptions of the forms, whi give few characters for a synoptical arrangement.

c'. Second pair of antennæ a little longer than half the length of the body. First article of the flagellum a little longer than the second. Inner face of the mandibles with three to four penicils. Terminal segment of abdomen a little excavate above. Color yellow or brown or dark, almost black, with obscure or yellowish spots arranged in from four to six longitudinal series, the first two lateral .... *Metoponorthus sexfasciatus* (Koch)

b'. Epistome smooth .... *Metoponorthus virgatus* Budde-Lund.

METOPONORTHUS SAUSSUREI Dollfus.

Metoponorthus saussurei Dollfus, Bull. Soc. Zool. France, XXI, 1896, p. 48.

Locality.—Cordova, Mexico.

Body oval, elongated, feebly and irregularly granulated; each segment of the abdomen has a posterior depression and the first segments are furnished on each side with a little pearl-like granulation.

Head(?) Thorax: The first segment has the posterior margin almost straight and not sinuated. Abdomen a little narrower; the lateral processes of the third to the fifth abdominal segments are well developed and a little divergent. Terminal segment triangular, with the sides incurved and obtuse at the apex. Uropoda with the basal segment reaching the apex of the terminal abdominal segment; inner and outer branches very much elongated, the former being linear, the latter lanceolate. Color, brownish with light wavy spots; there are three little light spots at the base of the terminal segment. Dimensions: Length, 10 mm.(?) Width, 3½ mm.[a]

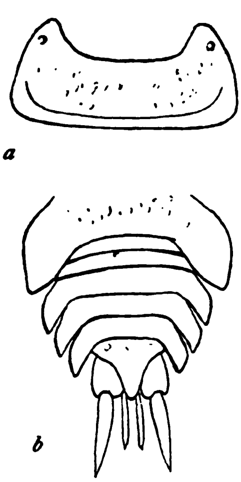

Fig. 673.—Metoponorthus saussurei (After Dollfus). *a*, First segment of thorax. *b*, Seventh thoracic segment, abdomen, and uropoda.

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[a] The above description is adapted from the following one by Dollfus:

Corps ovale, allongé, faiblement et irrégulièrement granulé; chaque segment du pleon présente une dépression postérieure et les premiers segments sont munis de chaque côté d'une petite granulation perliforme. Cephalon? Pereion=le premier segment a le bord postérieur presque droit et non sinueux. Pleon peu rétréci; les processus latéraux des segments 3 à 5 du pleon sont bien développés et un peu divergents. Pleotelson triangulaire, à côtés incurvés et à sommet obtus. Uropodes à base atteignant le sommet du pleotelson; endopodites et exopodites très allongés, les premiers linéaires et les seconds lancéolés. Couleur=brunâtre avec des marbrures et taches claires; trois petites taches claires à la base du pleotelson. Dimension=longueur 10 millimètres? Largeur, 3 millimètres ½.—Dollfus, Bull. Soc. Zool. France, XXI, 1896, p. 48.

METOPONORTHUS PRUINOSUS (Brandt).

Porcellio pruinosus Brandt, Bull. de la Soc. Imp. d. Naturalistes de Moscou, VI, 1833, p. 19.

Porcellio truncatus M. Edwards, Hist. Nat. des Crust., III, 1840, p. 171.

Porcellio maculicornis Koch, Deutschl. Crust., 1835–44, p. 34.

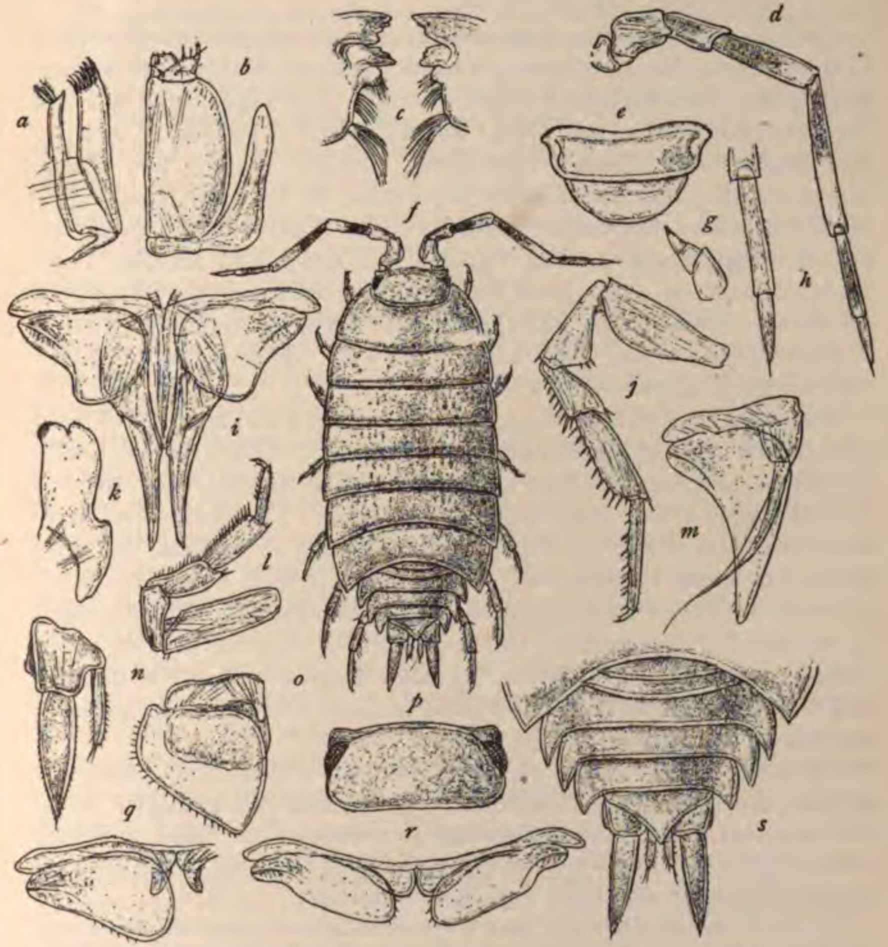

Fig. 674.—Metoponorthus pruinosus (after Sars). *a*, First maxilla. *b*, Maxilliped. *c*, Mandibles. *d*, Second antenna. *e*, Anterior lip. *f*, Dorsal view of male. *g*, First antenna. *h*, Flagellum. *i*, First pleopod of male. *j*, Seventh leg. *k*, Second maxilla. *l*, First leg. *m*, Second pleopod of male. *n*, Uropod. *o*, Third pleopod of female. *p*, Head. *q*, Second pleopod of female. *r*, First pleopods of female. *s*, Abdomen with uropoda.

Porcellio frontalis Lereboullet, Mém. Soc. Hist. Nat. Strasbourg, 1853, p. 63, pl. I, fig. 17; pl. III, figs. 81–87.

Porcellio zealandicus White, List Crust. Brit. Mus., 1847, p. 99.

Porcellionides flavo-vittatus Miers, Proc. Zool. Soc. Lond., 1877, p. 669, pl. LXVIII, fig. 4.

(?) *Porcellio jelskii* Miers, Proc. Zool. Soc. Lond., 1877, p. 668, pl. LXVIII, fig.

Metoponorthus pruinosus Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 169–171. (See Budde-Lund for synonymy.)—Dollfus, Bull. Soc. Zool. France, XVIII, 1893, p. 187.—Budde-Lund, Entom. Meddelel, IV, 1893–94, p. 118.—Sars, Crust. Norway, II, 1899, pp. 184–185, pl. lxxx, fig. 2.—Richardson, Amer. Nat., XXXIV, 1900, p. 303; Proc. U. S. Nat. Mus., XXIII, 1901, p. 569.—Chilton, Trans. Linn. Soc. Lond. (2), VIII, 1901, p. 141.—Stoller, 54th Report New York State Museum, 1902, p. 213.—Paulmier, Bull. New York State Museum, 1905, pp. 183–184.

Localities.—Columbus, Cincinnati, Andersons Ferry, Hamilton County, Ohio; Marion Center, Kansas; Oakland, California; Springfield, Ohio; Washington City; Provo, Utah; Las Vegas, Mesilla Park, New Mexico; Burlington, Ohio; Smiths Island, Virginia; Woodside, Maryland; Texas; Miami, Key West, Florida; Beverly and Salem, Massachusetts; San Antonio, Dallas, Texas; St. Thomas, West Indies; Hamilton Island, Bermudas; Mangrove Bay, Andros Island, Bahamas; also Europe; North Africa; Carácas, La Moka, and Merida, Venezuela; Praslin, etc. Found under logs; in greenhouses, dwellings, and on country roads; along walls and under decaying vegetable matter.

Body oblong-ovate, twice as long as wide, 4½ mm.: 9 mm. Abdomen abruptly narrower than thorax.

Head twice as wide as long, 1 mm.: 2 mm., with the anterior margin slightly convex; antero-lateral lobes small. The eyes are small, composite, and situated at the base of the antero-lateral lobes. The first pair of antennæ are small and inconspicuous. The second pair have the first article short; the second is twice as long as the first; the third is equal in length to the second; the fourth is twice as long as the third; the fifth is one and a half times as long as the fourth. The flagellum is composed of two articles, the first of which is twice as long as the second, and both taken together are almost equal in length to the fifth article of the peduncle. The second antennæ extend to the posterior margin of the fourth thoracic segment.

The first segment of the thorax is perhaps a little longer than any of the others, which are subequal. The antero-lateral angles of the first segment are produced forward to surround the head, and they extend to the base of the antero-lateral lobes of the head. The epimera are not distinctly separated from the segments.

The abdomen is abruptly narrower than the thorax. All six segments are distinct. The first two have the lateral parts covered by the seventh thoracic segment. The third, fourth, and fifth segments have the lateral parts small, not greatly expanded. The sixth or terminal segment is triangular in shape. It is 1 mm. wide at the base and is hardly more than ½ mm. long. The apex is acute, and there is a slight concavity in its dorsal surface. The basal article or peduncle of the uropoda is not longer than the apex of the terminal abdominal segment. The outer branch is 1½ mm. long and extends its entire length beyond the apex of the terminal abdominal segment. The inner branch extends about one-third the length of the outer branch.

All the legs are ambulatory in character.

The surface of the body is slightly granulated. In color the posterior and lateral margins are a uniform reddish brown. The other parts are a lighter color, formed of reddish brown with wavy lines of a light yellow on either side of the median line.

METOPONORTHUS SEXFASCIATUS (Koch).

? *Porcellio sexfasciatus* Koch, System der Myriapoden mit den Verzeichnissen und Berichtigungen zu Deutschlands Crustaceen, etc., 1847, p. 208, pl. VIII, fig. 99.

Metoponorthus sexfaciatus Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 167–168.—Dollfus, Bull. Soc. d'Études Scientifiques de Paris, 12th year, 1890, p. 4.—Richardson, Trans. Conn. Acad. Sciences, XI, 1902, p. 302.

Localities.—Bermudas (Dollfus); also Mediterranean and Canaries, Madeira, Azores, Spain, France, and Algeria.

Body oblong or oblong-ovate, slightly convex, finely but manifestly covered with transverse series of granules. The segments of the thorax each with a raised transverse line.

Inner face of the mandibles with three or four plumose processes. The second pair of antennæ are a little longer than half the length of the body; the fourth and fifth articles are sulcate; the first article of the flagellum is a little longer than the other. The antero-lateral lobes of the head are bent downward, very small, subrectangular; the median lobe is wanting, the frontal margin straight in the middle or a little produced; the transverse line of the epistome is acutely sinuated in the middle, terminating on both sides far from the frontal margin. The abdomen is less abruptly narrower than the thorax; the terminal segment is short, subtriangular, with the sides incurved, the apex acute and a little excavate above; the outer branches of the uropoda rather long.

Color yellow or brown, or dark black, covered with obscure or yellow spots in from four to six longitudinal series, the first two series being lateral. The epistome is black. The epimera of the thoracic segments have a minute shining tubercle. The ventral side and the legs are yellow; the coxæ are spotted with black. Length 10–12 mm. Width 3, 5 mm. to 4, 5 mm. Height 1, 8 mm. to 2 mm.[a]

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[a] The above description is adapted from the following one of Budde-Lund's:

Oblongus vel oblonge ovatus, leviter convexus, tenuiter et sparse sed manifesto transverse subseriatim granulatus. Trunci annuli linea elevata transversa.

Mala interior mandibularum penicillis 3–4.

Antennæ exteriores corporis dimidio paulo longiores; articuli 4–5 sulcati; flagelli articulus prior altero paulo longior.

Lobi frontales laterales deflexi, minimi, subrectanguli; lobus medius nullus, linea marginalis medio recta vel paulum producta; epistomatis linea transversa medio acutius sinuata, utrinque procul a margine frontali desinens. Cauda trunco minus abrupte angustior; annulus analis brevis, subtriangulus, lateribus incurvis, apice acuto, supra paulum excavatus; rami exteriores pedum analium sat longi.

Color flavus vel brunneus, vel e nigro fuscus, maculis vel obscuris vel flavescentibus in series longitudinales 4–6, imprimis duas laterales, digestis. Epistoma su nigrum. Epimera trunci annulorum tuberculo perlucente minuto. Venter et p flava; coxæ nigromaculatæ.

Longitudo 10–12 mm., latitudo 3, 5–4, 5 mm., altitudo 1, 8–2 mm.—Bu Lund, Crust. Isop. Terrestria, 1885, pp. 167–168.

METOPONORTHUS VIRGATUS Budde-Lund.

Metoponorthus virgatus BUDDE-LUND, Crust. Isop. Terrestria, 1885, p. 182.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 303; Proc. U. S. Nat. Mus., XXIII, 1901, p. 569.

Localities.—Florida; Nova Aurelia.

Body oblong oval, convex, smooth or obscurely and finely granulated and tuberculated.

Inner face of the right mandible furnished with four plumose processes, of the left mandible with five.

Second pair of antennæ equal to half the length of the body; the first article of the flagellum is shorter than the second.

Antero-lateral lobes of the head small, rounded; median lobe very small, widely rounded; epistome slightly convex, smooth. The terminal abdominal segment is short, triangular, with the sides straight; it is flat above, scarcely excavated.

Color grayish black; there are white tubercles in the middle of the thorax and white spots arranged in three longitudinal lines.

The epimera of the thorax are furnished with a shining tubercle distant from the margin. The legs are spotted with black, thickest on the coxæ.

Length 9–10 mm. Width 4, 5–5 mm. Height 2–2, 2 mm.[a]

112. Genus RHYSCOTUS Budde-Lund.[b]

Body rather convex, very little or scarcely at all contractile.

Second pair of antennæ long; flagellum composed of two articles, the first article shorter than the second. Eyes moderately large. Frontal marginal line bent downward before the eyes on either side, coming in contact with the vertical marginal line back of the eyes, passing through the pleuræ of the head and surrounding the inconspicuous antero-lateral lobes. Epistome very bulbous, separated from the front by a transverse groove.

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[a] The above description is adapted from the following one of Budde-Lund's:

Oblonge ovalis, convexus, sublævis vel obscure et tenuiter granulatus et tuberculatus.

Mala interior mandibulæ dextræ penicillis 4, mandibulæ sinistræ 5.

Antennæ exteriores corpus dimidium æquantes; flagelli articulus prior altero brevior.

Lobi frontales laterales parvi, rotundati; lobus medius minimus, late rotundatus; epistoma leviter convexum, læve.

Caudæ annulus analis brevis, triangulus, lateribus subrectis, supra planus, vix excavatus.

Color ex griseo niger; in medio trunco tubercula alba et maculæ albidæ in lineas tres longitudinales condensatæ. Trunci epimera tuberculo perlucente a margine paulum distante munita. Pedes, maxime in coxis, nigromaculati.

Longitudo 9–10 mm.; latitudo 4, 5–5 mm. Altitudo 2–2, 2 mm.—BUDDE-LUND, Crust. Isop. Terrestria, 1885, p. 182.

[b] See Budde-Lund for characters of genus, Crustacea Isopoda Terrestria, 1885, pp. 191–192.

Lateral parts of the thoracic segments small.

Abdomen abruptly narrower than thorax; terminal segment short, triangular, extending much beyond the epimera of the preceding segment.

First and second pairs of pleopods furnished with tracheæ.

RHYSCOTUS TURGIFRONS (Budde-Lund).

Stenomacrus turgifrons BUDDE-LUND, Prosp. generum specierumque Crust. Isop. Terrestrium, 1879, p. 5.

Rhyscotus turgifrons BUDDE-LUND, Crust. Isop. Terrestria, 1885, p. 192.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 569.

Locality.—St. Jean, West Indies.

Body oblong, posteriorly attenuated, rather convex, minutely and densely punctuate and covered with scattered hairs. The inner face of the mandibles is furnished with two plumose processes(?).

The second pair of antennæ are longer than half the length of the body; the first article of the flagellum is almost half as long as the second.

The terminal abdominal segment is short, with the sides slightly incurved, the apex obtuse; it is sulcate above. The uropoda are rather long; the basal article is longer than the terminal segment of the abdomen; the outer branch is conical; the inner branch is slender, a little curved, with the apex furnished with hairs.

Color brownish black, lighter on the epimera; ventral side a dark gray; legs dark. Length, 5 mm.; width, 2 mm.; height, 1.3 mm.[a]

113. HYPERGNATHUS, new genus.

Head with antero-lateral lobes obsolete; front not margined but continuous with epistome. Flagellum of second pair of antennæ composed of two articles, the second one being much longer than the first. Mandibles without molar expansion; recurved brush-like appendage wanting. First maxillæ with the inner lobe furnished with two plumose processes at the tip; outer lobe furnished with numerous spines at the tip. Second maxillæ more than twice as large as first maxillæ, not bilobed at the tip, the small inner lobe being indicated near the distal end of the inner margin of the larger outer lobe. Maxillipeds with palp reduced; masticatory lobe not developed.

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[a] The above description is adapted from the following one of Budde-Lund's:

Oblongus, post attenuatus, convexiusculus, minute et dense punctatus, sparse crinitus. Mala interior mandibularum penicillis binis(?).

Antennæ exteriores corpore dimidio longiores, flagelli articulus prior altero fere duplo brevior.

Caudæ annulus analis brevis, lateribus leviter incurvis, apice obtuso, supra sulcatus. Pedes anales longiusculi; articulus basalis annulo anali sublongior; ramus exterior terminalis conicus; ramus interior tenuis, paululum curvatus, apice setaceo.

Color e nigro brunneus, in epimeris dilutior; venter e fusco griseus; pedes fusci.

Longitudo, 5 mm.; latitudo, 2 mm.; altitudo, 1.3 mm.—BUDDE-LUND, Crust. Isop. Terrestria, 1885, p. 192.

Sixth segment of abdomen triangularly produced at the apex; first and second segments not covered laterally by the last thoracic segment. Inner branch of the uropoda is inserted at the inner distal angle of the peduncle.

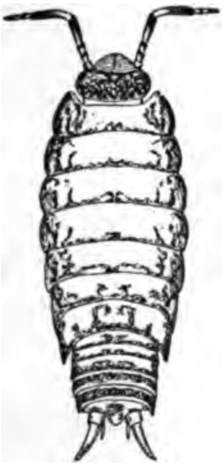
FIG. 675.—HYPERGNATHUS TEXENSIS.

HYPERGNATHUS TEXENSIS, new species.

Body oblong-ovate, more than twice as long as wide, 2½ mm. : 6 mm. Surface perfectly smooth.

Head a little wider than long, 1 mm. : 1½ mm., with the front not margined, straight, continuous between the eyes with the epistome, which is strongly arched, and gives the appearance of a median lobe. There are no lateral lobes. The lateral angles are rounded. The eyes are small, round, composite, and situated at the sides of the head close to the lateral margins. The first pair of antennæ are small and inconspicuous. The second pair have the first three articles short and subequal; the fourth is about one and a half times longer than the third; the fifth is twice as long as the third. The flagellum is composed of two unequal articles, the second one being three times as long as the first.

The seven segments of the thorax are about equal in length; the first one has the antero-lateral angles slightly produced forward and rounded; the last three have the post-lateral angles posteriorly produced, becoming gradually more acutely produced. The epimera are united with the segments.

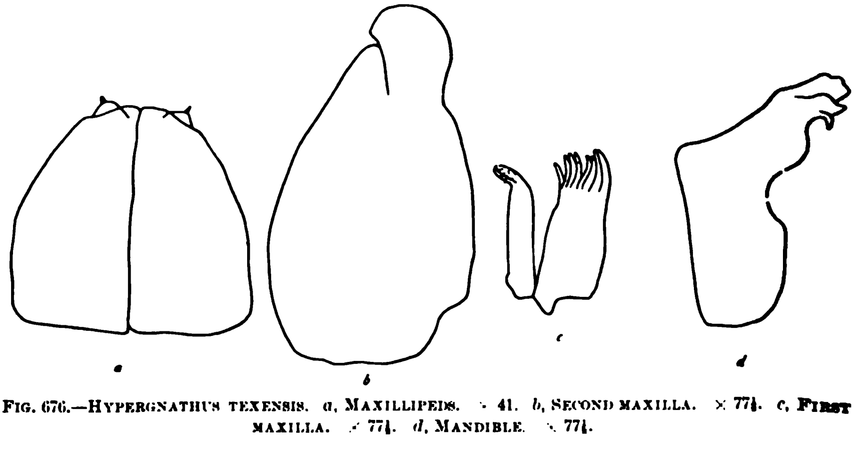

FIG. 676.—HYPERGNATHUS TEXENSIS. *a*, MAXILLIPEDS. × 41. *b*, SECOND MAXILLA. × 77½. *c*, FIRST MAXILLA. × 77½. *d*, MANDIBLE. × 77½.

The five anterior segments of the abdomen are subequal in length, the first two not being covered at the sides by the seventh thoracic segment. The sixth or terminal segment is posteriorly produced to a triangular extremity. The uropoda extend some distance beyond the terminal segment of the body. The peduncle extends beyond the terminal abdominal segment. The outer branch is twice as long as the peduncle. The inner branch is placed at the inner distal angle of the peduncle and is less than half the length of the outer branch.

The color is a light yellow, with irregular markings of brown on the posterior margins of the segments and on the lateral parts. The head is thickly covered with brown markings, which on the produced portion are arranged in definite transverse lines, but on the remaining surface are arranged irregularly around small, rounded, yellow areas. The abdomen is very closely covered with the brown as is also the posterior half of the outer uropod.

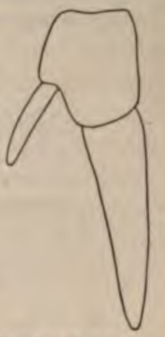

FIG. 677.—HYPERGNATHUS TEXENSIS. UROPOD. × 51⅓.

Types, Cat. No. 32075 U.S.N.M., collected by H. S. Barber in Texas.

114. Genus ACTONISCUS Harger.

Head produced in three lobes, a median lobe and an antero-lateral lobe on either side. Second pair of antennæ with the flagellum composed of four articles. First maxillæ with inner lobe furnished at the tip with two bunches of hairs; outer lobe furnished with numerous spines. Second maxillæ small, not larger than first maxillæ, with no indication of lobes at the tip. Masticatory lobe of maxillipeds truncate at the tip; palp with joints indistinctly defined.

Abdomen not abruptly narrower than thorax; the first two segments are covered laterally by the last thoracic segment; lateral parts of the third, fourth, and fifth segments well developed; terminal segment with apex not produced.

Basal article of the uropoda large, dilated, and simulating the epimera of the fifth abdominal segment; both branches of the uropoda short, styliform, the outer one inserted about the middle of the inner margin of the peduncle.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ACTONISCUS.

a. Middle frontal lobe of head acute; antero-lateral lobes rounded. Second and third articles of flagellum of second antennæ equal and longest. Terminal segment of abdomen broadly rounded. Surface of body smooth. Fifth article of the peduncle of the second antennæ longer than the fourth; terminal article of flagellum minute. Post-lateral angles of the first thoracic segment not produced.
Actoniscus ellipticus Harg

a'. Middle and antero-lateral lobes of head truncate. Second article of flagellum of second antennæ longest. Terminal segment of abdomen triangulate. Body covered with low tubercles. Fourth and fifth articles of the peduncle of the antennæ subequal; terminal article of flagellum not minute, but as long as preceding one. Post-lateral angles of the first thoracic segment produced.
Actoniscus lindahli, new species

ACTONISCUS ELLIPTICUS Harger.

Actoniscus ellipticus Harger, Am. Jour. Sci. (3), XV, 1878, p. 373; Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 309–310, pl. i, fig. 3.

Armadilloniscus ellipticus Budde-Lund, Crust. Isop. Terrestria, 1885, p. 239.

Actoniscus ellipticus Underwood, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 360.—Richardson, American Naturalist, XXXIV, 1900, p. 307; Proc. U. S. Nat. Mus., XXIII, 1901, p. 576; Trans. Conn. Acad. Sci., XI, 1902, p. 305.

Localities.—Savin Rock, near New Haven, Connecticut; Stony Creek, Long Island Sound; Bermudas; Hungry Bay, Bermudas.

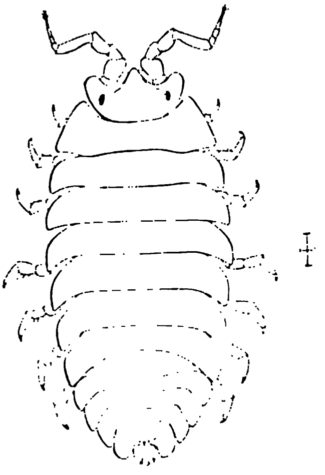

Fig. 678.—Actoniscus ellipticus (after Harger). × 10.

"The body is oval in outline. The head appears triangular, as seen from above, and is angularly produced in a median lobe, but the lateral lobes are also large and divergent and broadly rounded. The eyes are small, oval, black, and prominent. They are situated at the sides of the median triangular part of the head, and at the base of the lateral lobes. The antennulæ are minute and rudimentary. The antennæ have the basal segment short; the second enlarged distally, especially on the inner side; the third forming an angle with the second and clavate; the fourth flattened-cylindrical, longer than the third; fifth longest, slender, bent at base and forming an angle with the fourth; flagellum shorter than the last peduncular segment, tipped with setæ and composed of four segments, of which the second and third are equal and longer than the first, while the last is the shortest and presents indications of another minute rudimentary terminal segment. The maxillipeds have the basal segment nearly twice as long as broad; the terminal segment elongate triangular, ciliated, and somewhat lobed near the tip.

"The first thoracic segment is excavated in front for the head, admitting it about to the eyes. The next five segments are each a little longer than the first, but the last thoracic segment is the shortest. The first segment is dilated at the sides to about twice its length on the median line. The second and, in an increasing degree, the succeeding segments are produced backward at the sides. The legs are rather small and weak and of nearly equal size throughout.

"The first two segments of the pleon have their lateral processes, or coxæ, obsolete, as usual in the family, but the third, fourth, and fifth segments are produced laterally into broad plates, which are close together and at their extremities continue the regular oval outline of the body with scarcely a perceptible break between the thorax and the pleon. This outline is further continued by the expanded basal segment of the uropods, which are even larger than the adjacent coxæ of the fifth segment. At the extremity of the pleon both pairs of rami are visible, the inner springing from near the base of the basal segments below, the outer from a notch near the middle of the inner margin of the basal segment. The rami are tipped with setæ, and the inner just surpass the outer, which in turn surpass the produced portion of the basal segments.

"Length, 4 mm.; breadth, 2 mm.; color in life, slaty gray."—Oscar Harger.[a]

ACTONISCUS LINDAHLI, new species.

Body oblong-oval, a little more than twice as long as wide, 2 mm. : 4½ mm. Surface of body distinctly covered with low tubercles.

Head with the anterior margin produced in three long lobes, the median one having the dorsal surface concave and being produced as far as the lateral lobes. All three lobes have the anterior extremities truncate. The eyes are small, composite, and placed at the base of the lateral lobes. The first pair of antennæ are small and inconspicuous. The second pair have the first article short; the second is about twice as long as the first; the third is equal in length to the second; the fourth and fifth are subequal and each is about one and a half times longer than the third. The flagellum is composed of four articles, of which the second is the longest.

The segments of the thorax are subequal. The post-lateral angles of the first segment are produced backward in acute processes. The antero-lateral angles of this segment are also somewhat produced to surround the head. The epimera are not distinctly separated on any of the segments.

All six segments of the abdomen are distinct. The first two have the lateral parts covered by the seventh thoracic segment. The lateral parts of the third, fourth, and fifth segments are expanded so as to continue the oval outline of the body. The sixth or terminal segment is triangular in shape, with apex acute. The basal article or peduncle of the uropoda is large and expanded and simulates the lateral parts of the fifth abdominal segment. The outer branch is inserted at the inner margin of the basal article about halfway between the base and the extremity; it does not extend beyond the posterior margin of the basal article. The inner branch is inserted at the upper inner angle of the basal article on the underside; it is about twice as long as the outer branch, but does not extend beyond the extremity of the outer branch.

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[a] Report U. S. Fish Comm., 1880, Pt. 6, pp. 309–310.

The legs are all similar in structure and ambulatory.

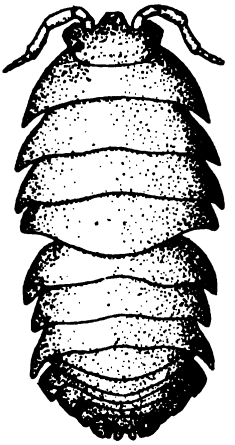

Fig. 679.—Actoniscus lindahli. × 13.

In color it is a reddish brown with wavy lines of a light yellow on either side of the median line.

About ten specimens were collected in Oakland, California, by Prof. Josua Lindahl.

This species is very similar to the type and only described species of the genus, *Actoniscus ellipticus* Harger, but differs in having the surface of the body covered with low tubercles; in having the three lobes of the head anteriorly truncate, while in *A. ellipticus* the median one is acutely pointed, the lateral ones rounded; in having the fourth and fifth articles of the peduncle of the antennæ subequal, and the second article of the flagellum longest, the terminal article not minute, but as long as the preceding one; in having the post-lateral angles of the first thoracic segment produced in acute processes, and in having the sixth or terminal segment of the abdomen triangular rather than rounded.

This species is named in honor of Prof. Josua Lindahl, from whom the specimens were received.

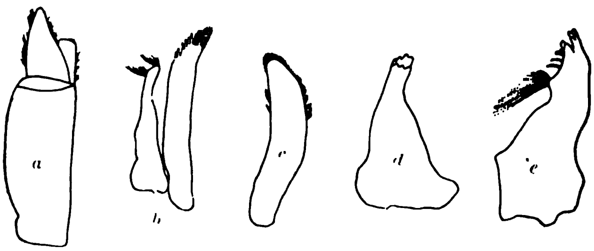

Fig. 680.—Actoniscus lindahli. *a*, Maxilliped. × 62. *b*, First maxilla. × 62. *c*, Second maxilla. × 62. *d*, Mandible. × 62. *e*, Mandible. × 62.

The types are in the museum of the Cincinnati Society of Natural History. Cat. No. 16365.

115. Genus ACANTHONISCUS (White) Kinahan.

"Body somewhat globose; head rounded; no true median or lateral lobes; a pair of small spurious lateral lobes beneath orbits, arising from production of antennary ring; external antennæ (?); internal antennæ three-jointed.

"Cephalothorax: coxæ well marked. Abdomen: coxæ of first and second somite obsolete; third to fifth narrow.

"Telson: coxæ obsolete; posterior pleopoda (false feet) nearly uncovered; peduncle (basis) somewhat triangular, broad; accessory lobe badly marked; accessory appendage inserted nearly on same line with ischium, flattened, rounded at the extremity; ischium long, subulate. Species, *A. spiniger*."—KINAHAN.[a]

ACANTHONISCUS SPINIGER White.

Acanthoniscus spiniger WHITE, List. Crust. Brit. Museum, 1847, p. 99.—GOSSE, A Naturalist's Sojourn in Jamaica, 1851, p. 65.—KINAHAN, Proc. Dublin University, I, 1859, p. 197, pl. XIX, fig. 4.—BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 241-242.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 569.

Locality.—Jamaica.

"Body covered over with long spines arranged in a double longitudinal row, one spine to each ring. In cephalothorax a second row of shorter spines (two to each ring) on each side at junction of coxæ and body.

"Head covered with coarse knobs; two minute spines behind; a raised emarginate ridge marks out front.

"Coxæ of first cephalothoracic somite expanded into a circular lobe; coxæ of second to sixth somite narrow; seventh somewhat quadrilateral.

"Abdominal somites: coxæ, first and second, obsolete; third, fourth, and fifth, narrow, curved, triangular.

"Telson cordato-panduriform: apex deeply notched, its extremities triangular, produced, acuminate; sides of telson deeply incurved at base and then broadly convex. Posterior pleopods: accessory filament somewhat flattened; rounded at the extremity, about half length of ischium, and arising from a point distant from apex about a third of total length of peduncle. Ischium long and subulate. Peduncle prolonged as a spine external to origin of ischium. Color: deep chocolate brown black, with lighter patches.

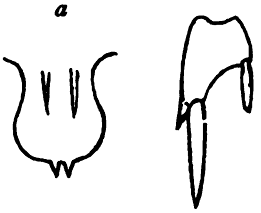

FIG. 681.—ACANTHONISCUS SPINIGER (AFTER KINAHAN). *a*, TERMINAL SEGMENT OF ABDOMEN. *b*, UROPOD.

"Locality: Jamaica.

"The specimen in the British Museum, the only one I have seen, wants the external antennæ; but from the fragments of those that remain, and other characters, an affinity can be traced between this genus and the Porcellionidæ. See Remarks on *Deto*, infra.

"The form of the telson is unique; the posterior pleopods show an approximation to *Deto;* but in the absence of the antennæ it is impossible to speak positively."—KINAHAN.[a]

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[a] Proc. Dublin University, I, 1859, p. 197.

Family XXVI. ARMADILLIDIDÆ.[a]

Body convex, contractile into a perfect ball.

Pleural parts of the head fused.

Front of head truncate, marginate; antero-lateral lobes distinct; median lobe wanting; epistome vertical; clypeus perpendicular.

First pair of antennæ small, inconspicuous; flagellum composed of two or three articles. Second pair of antennæ generally short, distant; antennal foramina small.

Abdomen not abruptly narrower than thorax; terminal segment short and broad.

Opercular plates of the first two pairs of pleopoda or of all five pairs provided with tracheæ.

Uropoda short, flattened, not extending beyond the extremity of the terminal abdominal segment or the lateral parts of the preceding segment.

The young, when hatched, have all seven segments of the thorax present.

Mouth parts as in the Oniscidæ. Legs comparatively short.

ANALYTICAL KEY TO THE GENERA OF ARMADILLIDIDÆ.

a. Outer branch of the uropoda very small or minute. Basal joint large.
  b. Flagellum of external antennæ with two or three joints.
    c. Flagellum with two joints.
      d. Last abdominal segment subtetragonal, base wider than apex, more or less contracted in the middle. External branch of the uropoda inserted in the middle of the internal lateral margin of the basal joint. Coxopodites of first and usually of the second segments distinct from the segments (underside) ....Genus *Cubaris* Brandt.
      d′. Last abdominal segment trapezoidal or subcordiform, narrower at its truncate apex. External branch of the uropoda inserted in the inner post-lateral angle of the basal joint. Coxopodites of the first and second segments distinct (underside) ....Genus *Pseudarmadillo* Saussure.
    c′. Flagellum with three joints. Coxopodites of the first segment usually distinct on the underside. Terminal segment of body very short, rounded or posteriorly triangular. External branch of the uropoda inserted in the inner post-lateral angle of the quadrangular basal joint, and extending downward. Inner branch reaches much beyond the terminal segment of the body..............................Genus *Sphæroniscus* Gerstaecker.
  b′. Flagellum of external antennæ with a single joint only. Coxopodite distinct on the first segment (underside). External branch of the uropoda inserted at inner post-lateral angle of the basal joint......Genus *Haplarmadillo* Dollfus.

a′. Outer branch of the uropoda large, flattened, lamellar, inserted at the apex of the basal joint.
  b. Terminal abdominal segment triangular in shape. Inner branch of uropoda conical. All seven pairs of legs present. Seventh thoracic segment with lateral parts well developed ....Genus *Armadillidium* Brandt.
  b′. Terminal abdominal segment quadrangular in shape. Inner branch of the uropoda flattened, rounded. Only six pairs of legs present. Lateral parts of seventh segment of thorax not developed......Genus *Uropodias* Richardson.

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[a] See Budde-Lund for characters of family, Crust. Isop. Terrestria, 1885, pp. 14–15, " Sars. Crust. of Norway, II, 1899, pp. 187–188.

116. Genus CUBARIS Brandt.

First pair of antennæ very small, inconspicuous, composed of three articles. Second pair of antennæ short, generally not longer than one-third the length of the body; flagellum composed of two articles.

Eyes composite, small or moderately large. Clypeus very short, with the anterior margin entire, lobate at the sides. Epistome flat, forming a continuously straight frontal marginal line. The vertical marginal line reaches the frontal line.

First thoracic segment with the epimera posteriorly cleft, often also the second; rarely entire. Terminal abdominal segment tetragonal, wider at the base than at the apex, more or less contracted in the middle.

Outer branch of all the pleopoda furnished with tracheæ. Uropoda short, not extending beyond the terminal abdominal segment. Basal article or peduncle large, wide, entire, tetragonal, obliquely produced; outer branch very small, rather slender, inserted at the middle of the inner lateral margin of the basal article; inner branch small, rather slender or rather compressed.[a]

ANALYTICAL KEY[b] TO THE SPECIES OF THE GENUS CUBARIS.

- *a.* Body tuberculate.
  - *b.* Second thoracic segment without a distinct coxopodite.
    - *c.* Coxopodite of the first thoracic segment hardly perceptible as a very small process below the leg. Prosepistoma of head with a shield-like convexity. Apex of telson half as wide as basis. Endopodite of the uropoda extends one-half the length of the telson .... *Cubaris tenuipunctata* (Dollfus)
    - *c′.* Coxopodite of the first thoracic segment hardly perceptible, only a feeble ridge. Prosepistoma of head nearly flat. Apex of telson one-third narrower than basis. Endopodite of the uropoda extends two-thirds the length of the telson .... *Cubaris depressa* (Dollfus)
  - *b′.* Second thoracic segment with a distinct coxopodite (underside).
    - *c.* Coxopodite of the first thoracic segment distant from the edge, crested, and ended by a tooth-like diverging process .... *Cubaris viticola* (Dollfus)
    - *c′.* Coxopodite of the first thoracic segment not distant from the edge and not crested.
      - *d.* Coxopodite of the first thoracic segment distinct along the entire length of the edge (underside).
        - *e.* Coxopodite of the first segment divergent on the half hind part. Coxopodite of the second segment forming a tooth-like diverging process. *Cubaris silvarum* (Dollfus)
        - *e′.* Coxopodite of the first segment not divergent. Coxopodite of the second segment large, square-shaped .... *Cubaris perlata* (Dollfus)
      - *d′.* Coxopodite of the first thoracic segment not distinct along the entire length of the edge.
        - *e.* Coxopodite of the first segment small, dentiform, and very unequally cleft .... *Cubaris murina* Brandt

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[a] See Budde-Lund for characters of genus, Crust. Isop. Terrestria, 1885, pp. 15–16.

[b] *Cubaris californica* (Stuxberg) is not included in this key, as the description is not sufficient in detail to obtain characters for synoptical arrangement.

c′. Coxopodite of the first segment not dentiform, subequally cleft.
Cubaris cincta (Dollfus)

a′. Body smooth.

b. Upper surface of terminal segment of body with a shallow depression on each side, and a small median pit near the base................*Cubaris gigas* Miers

b′. Upper surface of terminal segment of body without shallow depression on each side, or median pit.

c. Inner posterior angle of basal article of uropoda widely excavated.
Cubaris affinis (Dana)

c′. Inner posterior angle of basal article of uropoda not excavated.

d. Coxopodite distinct on the entire length of the lateral edge of the first thoracic segment (underside)........................*Cubaris zigzag* (Dollfus)

d′. Coxopodite not distinct on the entire length of the lateral edge of the first thoracic segment.

e. Second thoracic segment with a large square coxopodite, distinct on its total length (underside)...................*Cubaris dumorum* (Dollfus)

e′. Second thoracic segment with the coxopodite very small.

f. Coxopodite of second thoracic segment forming a tooth-like process.

g. Inner branch of uropoda about half the length of the terminal abdominal segment. Terminal abdominal segment with a blunt double tubercle near the base............*Cubaris grenadensis* (Budde-Lund)

g′. Inner branch of uropoda extends about one-third the length of the terminal abdominal segment. Terminal abdominal segment without double tubercle near the base................*Cubaris dugesi* (Dollfus)

f′. Coxopodite of second thoracic segment not tooth-like.
Cubaris pisum (Budde-Lund)

CUBARIS TENUIPUNCTATA (Dollfus).

Armadillo tenuipunctatus DOLLFUS, Proc. Zool. Soc. London, 1896, p. 389.
Cubaris tenuipunctatus RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 571.

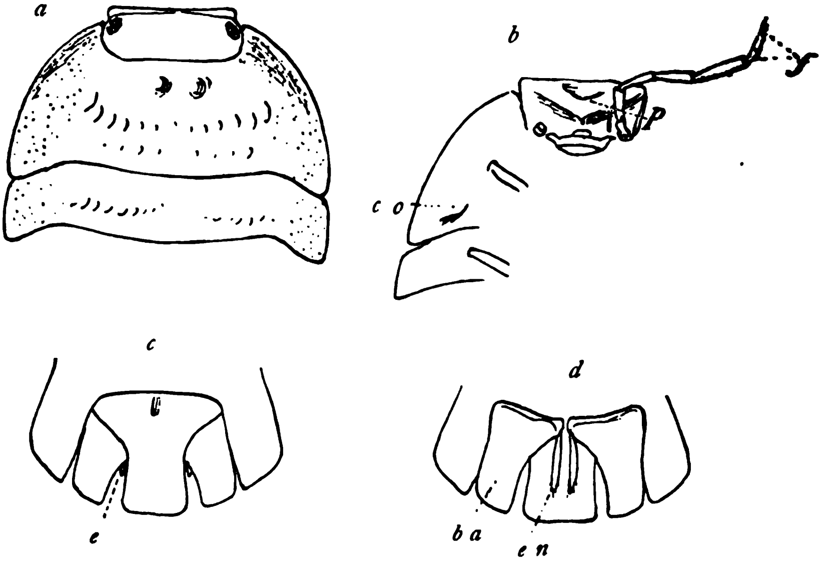

FIG. 682.—CUBARIS TENUIPUNCTATA (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UPPER SIDE). *b*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UNDERSIDE). *c*, FIFTH AND SIXTH SEGMENTS OF ABDOMEN AND UROPODA (UPPER SIDE). *d*, THE SAME (UNDERSIDE).

Locality.—Mustique Island, West Indies. "Beaten from brush."

"Body rather wide, moderately convex, slightly tuberculated on the pereion. Cephalon: prosepistoma with a shield-like convexity, a little depressed in the middle. Eyes middling; ocelli about 18. Antennæ short; first joint of flagellum twice as short as the second. Pereion: first segment with two antero-median rounded tubercles; lateral edges slightly raised; coxopodite hardly perceptible, as a very small process below the leg. Second segment without a distinct coxopodite. Pleon, telson: pleotelson longer than wide, smooth, with a minute longitudinal wrinkle near the basis; sides feebly curved, the apex being half as wide as the basis. Uropoda: basis nearly straight; endopodite extending to half the length of the pleotelson; exopodite very small, placed near the middle of the internal edge of the basis (upperside). Color: gray, with irregular light markings; the sides are light and minutely punctuated with black. Dimensions: 10 by 4½ mm."—DOLLFUS.[a]

CUBARIS DEPRESSA (Dollfus).

Armadillo depressus DOLLFUS, Proc. Zool. Soc. London, 1896, p. 390.

Cubaris depressus RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 571.

Localities.—St. Vincent, Chateaubelais, West Indies.

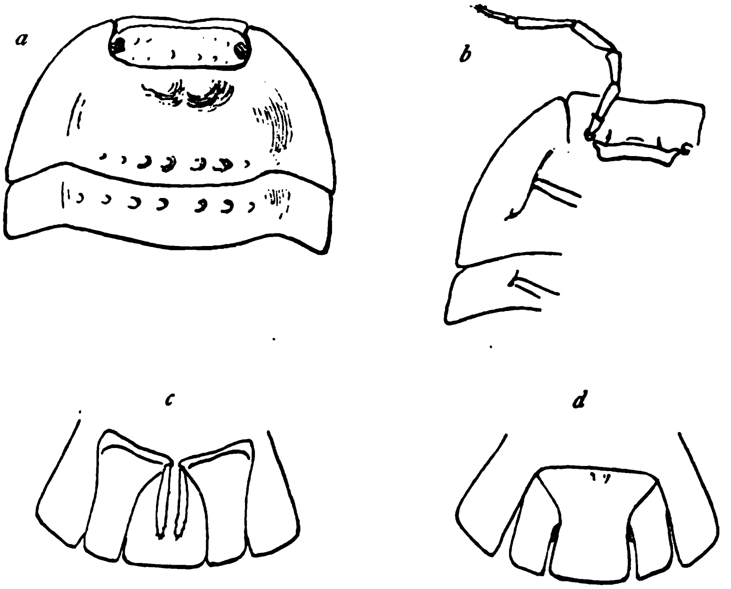

FIG. 683.—CUBARIS DEPRESSA (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UPPER SIDE). *b*, THE SAME (UNDERSIDE). *c*, FIFTH AND SIXTH SEGMENTS OF ABDOMEN AND UROPODA (UPPER SIDE). *d*, THE SAME (UNDERSIDE).

"Body wide, rather depressed, granulated on cephalon and pereion. Cephalon: prosepistoma nearly plain, fore edge a little arched in the

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[a] Proc. Zool. Soc. London, 1896, p. 389.

middle. Eyes middling; ocelli about 16. Antennæ: first joint of flagellum three times shorter than the second. Pereion: first segment with a wide, double, antero-median tubercle; lateral edges not raised; coxopodite hardly perceptible, as a feeble ridge. Second segment without a distinct coxopodite. Pleon, telson: sides of the pleon depressed; processus of the fifth segment widening at the apex. Pleotelson longer than wide, smooth; sides feebly curved; apex one-third narrower than the basis. Uropoda nearly straight; endopodite extending to two-thirds the length of the pleotelson; exopodite very small, placed near the middle of the internal edge of the basis (upperside). Color: dark gray, with a narrow light longitudinal line in the middle of the pereion and light lineolæ on both sides. Dimensions: 9 by 4½ mm." DOLLFUS.[a]

CUBARIS VITICOLA (Dollfus).

Armadillo viticola DOLLFUS, Proc. Zool. Soc. London, 1896, pp. 396–397.
Cubaris viticola RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 571.

Localities. Grenada, Balthazar, Chantilly, West Indies. Second-growth woods, beaten from vines and brush, 250 feet and 400 feet.

"Body very convex in the middle, rather depressed on the sides, covered with transverse lines of granulations. Cephalon: prosepistoma plain, fore edge slightly arched in the middle. Eyes moderate; ocelli 12. Antennæ short; first joint of the flagellum three times shorter than the second. Pereion: first segment with four large antero-median granulations; lateral edges hardly raised; coxopodite distant from the edge, crested and ended by a tooth-like diverging

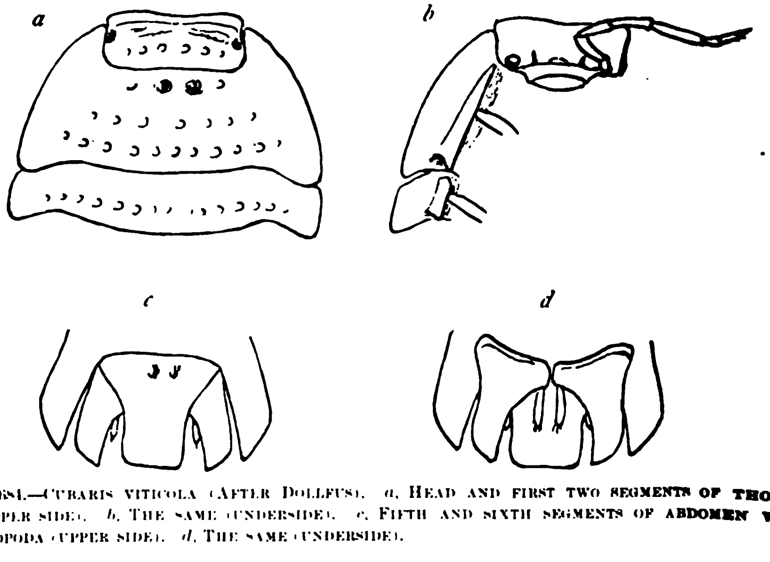

FIG. 684.—CUBARIS VITICOLA (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UPPER SIDE). *b*, THE SAME (UNDERSIDE). *c*, FIFTH AND SIXTH SEGMENTS OF ABDOMEN WITH UROPODA (UPPER SIDE). *d*, THE SAME (UNDERSIDE).

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[a] Proc. Zool. Soc. London, 1896, p. 390.

processus. Second segment with a narrow crested coxopodite. Pleon, telson: lateral parts of the pleon narrow; pleotelson longer than wide; sides slightly curved; apex one-half narrower than the basis, with rounded angles. Uropoda: basis very oblique; endopodite reaching to one-half the length of the pleotelson; exopodite a little larger than in the former species (*C. perlatus*), visible on upper and under sides. Color: yellowish, veined, and striped with brown. Dimensions: 9 by 4 mm."—DOLLFUS.[a]

CUBARIS SILVARUM (Dollfus).

Armadillo silvarum DOLLFUS, Proc. Zool. Soc. London, 1896, pp. 393–394.
Cubaris silvarum RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 571.

Localities.—St. Vincent, Chateaubelais; Cumberland Valley, West Indies. Very common under rubbish, forest below 2,000 feet (St. Vincent). Forest, dry hillside under stones, 1,000 feet (Chateaubelais). Damp ground, 1,000 feet (Cumberland Valley).

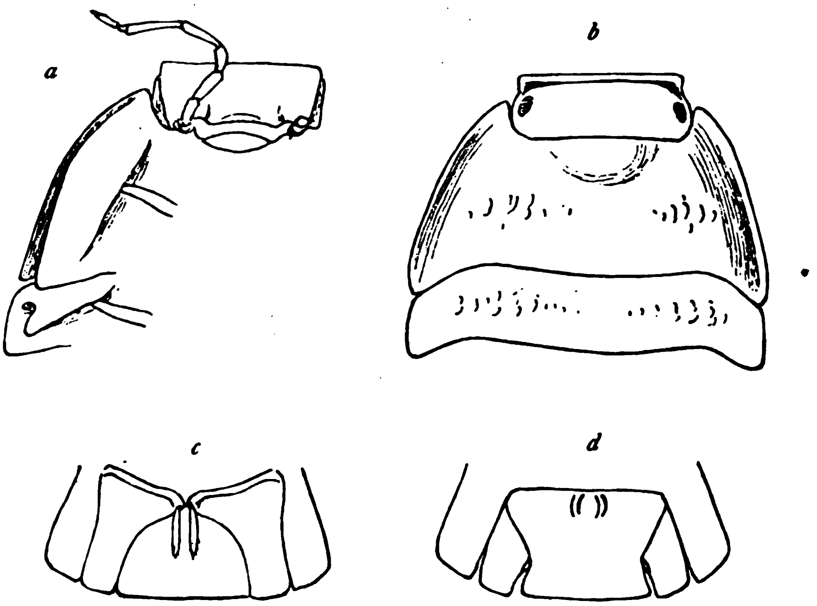

FIG. 685.—CUBARIS SILVARUM (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UPPER SIDE). *b*, THE SAME (UNDERSIDE). *c*, FIFTH AND SIXTH SEGMENTS OF ABDOMEN AND UROPODA (UPPER SIDE). *d*, THE SAME (UNDERSIDE).

"Body convex, slightly tuberculated on the pereion. Cephalon: prosepistoma plain. Eyes large; about 20 ocelli. Pereion: first segment with a blunt, hardly perceptible antero-median tubercle; lateral edge forming a narrow, raised border; coxopodite distinct on the entire length of the edge and divergent on the half hind part. Coxo-

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[a] Proc. Zool. Soc. London, 1896, pp. 396–397.

podite of the second segment forming a tooth-like, divergent processus. Pleon, telson: pleotelson wider than long, with a small, double, longitudinal ridge near the basis; sides curved near the apex; apex one-fourth narrower than the basis. Uropoda: endopodite extending to one-half the length of the pleotelson; exopodite minute, placed near the middle of the internal edge of the basis. Color: dark gray or brown, with three longitudiual light lines and a wide spot on the sides of each segment; antennæ and uropoda pale. Dimensions: 16 by 7 mm."—DOLLFUS.[a]

CUBARIS PERLATA (Dollfus).

Armadillo perlatus DOLLFUS, Proc. Zool. Soc. London, 1896, pp. 395–396.
Cubaris perlatus RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 571.

Locality.—St. Vincent, West Indies. Dry forest, leeward, under a log, 800 feet.

"Body convex, covered with large, pearled granulations. Cephalon: prosepistoma with a shield-like convexity which does not reach quite to the front edge. Eyes very small; ocelli 3. Antennæ short; first joint of the flagellum three times as short as the second. Pereion: first segment with two rounded antero-median granulations; lateral edges raised; coxopodite distinct on the entire length of the edge, but not divergent. Second segment with a large and very distinct coxopodite. Pleon, telson: pleotelson, nearly as wide as long, with two large, rounded granulations near the basis; sides curved; apex a little narrower than the basis. Uropoda: endopodite reaching to two-

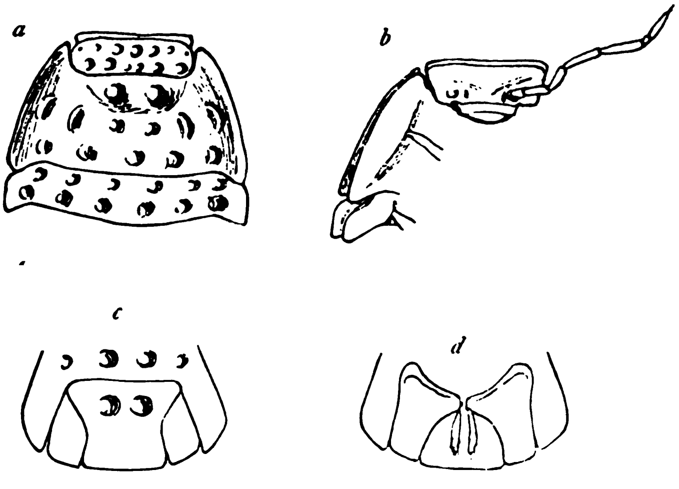

FIG. 686.—CUBARIS PERLATA (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UPPER SIDE). *b*, THE SAME (UNDERSIDE). *c*, FIFTH AND SIXTH SEGMENTS OF ABDOMEN (UPPER SIDE). *d*, THE SAME (UNDERSIDE).

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[a] Proc. Zool. Soc. London, 1896, pp. 393–394.

ls the length of the pleotelson; exopodite unperceivable. Color: ; gray, granulations whitish. Dimensions: 4½ by 1½ mm."—LFUS."[a]

CUBARIS MURINA Brandt.

'ubaris murina Brandt, Bull. Soc. Imp. d. Naturalistes de Moscou, VI, 1833, p. 28.
ubaris brunnea Brandt, Bull. Soc. Imp. d. Naturalistes de Moscou, VI, 1833, p. 28.
rmadillo murinus Milne Edwards, Hist. Nat. des Crust., III, 1840, p. 179.
rmadillo brunneus Milne Edwards, Hist. Nat. des Crust., III, 1840, p. 179.
rmadillo cubensis Saussure, Mém. de la Soc. de Physique et d'Hist. nat de Genève, XIV, 1858, Pt. 2, p. 65.
ubaris affinis Miers, Proc. Zool. Soc., London, 1877, p. 666, pl. LXVIII, fig. 4.
rmadillo conglobator Budde-Lund, Prosp. generum specierumque Crust. Isop. Terrestrium, 1879, p. 7.
rmadillo murinus Budde-Lund, Prosp. generum specierumque Crust. Isop. Terrestrium, 1879, p. 7; Crust. Isop. Terrestria, 1885, pp. 27, 28. (See Budde-Lund for synonymy.)
ubaris murinus Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 571.

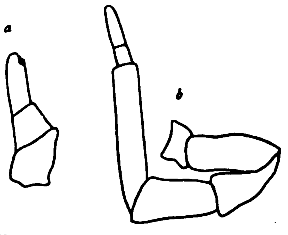


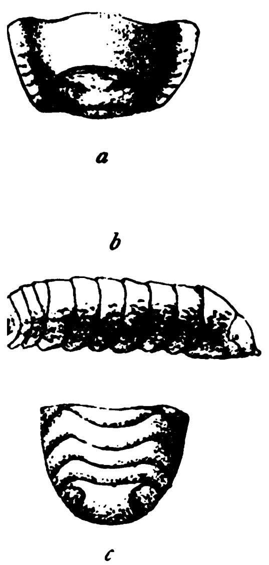
Fig. 687.—Cubaris murina. *a*, First antenna. × 77½. *b*, Second antenna. × 23.

Localities.—Pinar del Rio, Cuba; El Guama, Cuba; Guanajay, Cuba; Pueblo Viejo, Porto Rico; St. Thomas; Jamaica; also, Oahu and Honolulu, Hawaiian Islands; Brazil; Cayenne; Seychelle Islands; Sumatra.

Found under stones; in damp caves.

Body ovate, very convex, and contractile into a ball, a little more than twice as long as wide, 5 mm.: 11 mm.

Head three times as wide as long, 1 mm.: 3 mm., with the anterior margin straight. Eyes small, round, composite, and situated at the sides of the head, halfway between the anterior and the posterior margins. The first pair of antennæ are rudimentary and inconspicuous. They are composed of three articles. The second pair of antennæ have the first two articles short and subequal; the third article is about three times as long as the second; the fourth and fifth are subequal and each ittle shorter than the third; the sixth article is one and a half times



8.—Cubaris murina (After rs). *a*, Head and first tho- c segment. *b*, Lateral view of . *c*, Abdomen and uropoda.

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[a] Proc. Zool. Soc. London, 1896, pp. 395–396.

longer than the fifth. The flagellum is composed of two articles, the first of which is about half as long as the second. The second antennæ extend to the middle of the first thoracic segment. The maxilliped has a palp of three articles. The palp of the mandibles is wanting.

The first segment of the thorax is about one and a half times longer than any of the others, which are subequal. The lateral parts of the first segment are produced backward posteriorly, and anteriorly they are produced surrounding the head and extending to its anterior margin. The lateral margins of the first segments curve slightly upward. There are no epimera separated off on any of the segments from above. The epimera of the first two segments are distinct on the underside. They are very small. Those of the first segment do not extend the entire length of the segment, but are represented only at the posterior extremity.

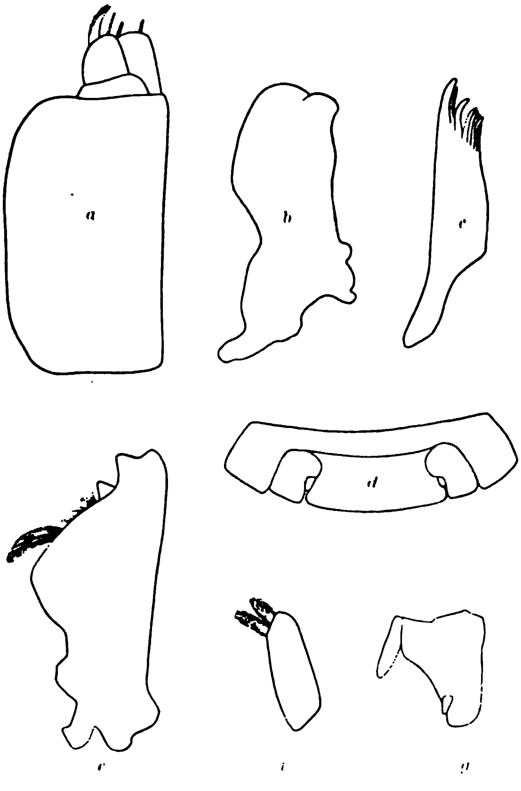

FIG. 689.—CUBARIS MURINA. *a*, MAXILLIPED. × 51⅓. *b*, SECOND MAXILLA. × 51⅓. *c*, FIRST MAXILLA (OUTER LOBE). × 51⅓. *d*, TERMINAL SEGMENT WITH UROPODA. 15⅓. *e*, MANDIBLE. × 51⅓. *f*, FIRST MAXILLA (INNER LOBE). 51⅓. *g*, UROPOD. 27⅓. (FROM UNDERSIDE.)

The abdomen is not narrower than the thorax. The lateral parts of the first two segments are covered by the seventh thoracic segment. The sixth, or terminal, segment is 2 mm. wide at the base, becoming constricted about the middle, where it is 1 mm. wide, and then expanding to a truncate extremity, which is 2 mm. wide. The length of the terminal segment is 1½ mm. The basal article or peduncle of the uropoda is narrow and elongate, about twice as wide as long, and fills the space between the lateral parts of the fifth abdominal segment and the terminal abdominal segment. The outer branch is extremely small, and is inserted on the inner margin of the peduncle, about halfway between the anterior and posterior end. The inner branch is not visible from the dorsal side. Underneath, on the ventral side, it is small and elongated, extending only half the length of the terminal segment.

CUBARIS CINCTA (Dollfus).

Armadillo cinctus DOLLFUS, Proc. Zool. Soc. London, 1896, p. 392.
Cubaris cinctus RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 572.

Locality.—Near Layon, West Indies. On rotten wood, dry forest.

"Body moderately convex, rather wide, depressed on the fore and hind parts of the segments, with a transverse range of tubercles on each segment. Cephalon: prosepistoma nearly plain, fore edge straight. Eyes middling; ocelli about 16. Antennæ: first joint of the flagellum twice as short as the second. Pereion: first segment with a double antero-median tubercle; lateral edges raised; coxopodite distinct and divergent on the third hind part of the edge (underside). Coxopodite of the second segment forming a narrow, quadrangular processus. Pleon, telson: pleotelson as long as wide, with a triangular tubercle near its basis; sides curved; apex one-fourth narrower than the basis. Uropoda: basis nearly straight; endopodite very small, extending hardly to one-sixth the length of the pleotelson: exopodite minute, placed above the middle of the internal edge of the basis (upperside). Color: dark gray, with small lighter lineolæ on both sides of the median line (pereion) and three light dots on the pleotelson. Dimensions: 7½ by 3¼ mm."—DOLLFUS.[a]

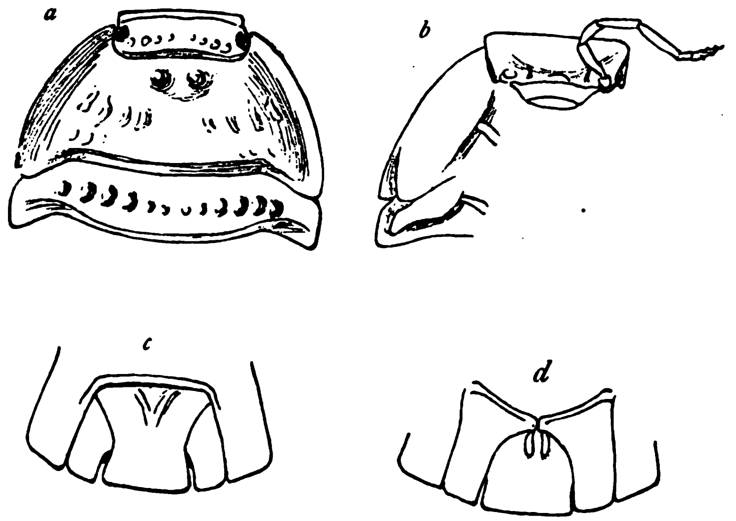

FIG. 690.—CUBARIS CINCTA (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UPPER SIDE). *b*, THE SAME (UNDERSIDE). *c*, FIFTH AND SIXTH SEGMENTS OF ABDOMEN AND UROPODA (UPPER SIDE). *d*, THE SAME (UNDERSIDE).

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[a] Proc. Zool. Soc. London, 1896, p. 392.

CUBARIS GIGAS Miers.

Cubaris gigas Miers, Proc. Zool. Soc. London, 1877, p. 666, pl. LXVIII, fig. 1.
Armadillo gigas Budde-Lund, Crust. Isop. Terrestria, 1885, p. 40.
Cubaris gigas Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 572.

Locality. —Nicaragua, near San Juan.

"Convex oblong-oval, nearly smooth, surface only very minutely granulated, and with only very obscure indications of larger tubercles on each side of the middle line. Head transverse, with the anterior margin straight, reflexed at a right angle (as seen in a lateral view) with the upper surface of the head, and (as seen in a dorsal view) also forming a right angle with the lateral margins; antero-lateral lobes wanting. First segment of the body very concave on the sides, with the lateral margins strongly reflexed; all the segments distinctly flexed backward on the sides, with the posterior margins angulate-excavate. Terminal segment of the tail about as broad as long, with the sides excavated; upper surface flat, with a shallow depression on each side, and a small median pit near the base. Antennæ with the flagellum much shorter than the last joint of the peduncle, with the first joint the shortest. Basal joint of the uropoda (viewed from above) oblong, terminal (apparent lateral) joint quite minute. Colour light gray. Length 10½ lines."—Miers.[a]

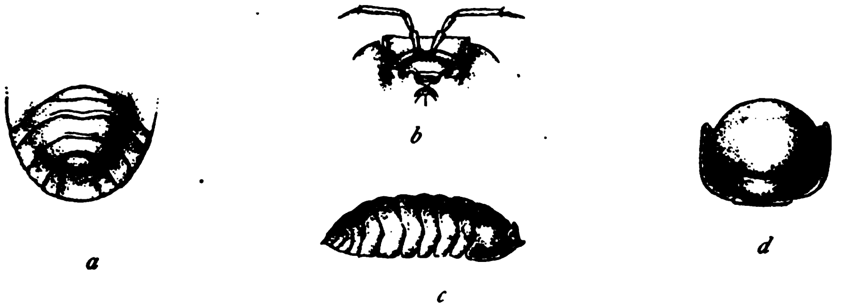

FIG. 691.—CUBARIS GIGAS (AFTER MIERS). *a*, ABDOMEN WITH UROPODA (UPPER SIDE). *b*, HEAD (UNDERSIDE) SHOWING ANTENNÆ. *c*, LATERAL VIEW. × 1½. *d*, HEAD AND FIRST THORACIC SEGMENT (UPPER SIDE).

CUBARIS AFFINIS (Dana).

Spherillo affinis Dana, Proc. Acad. Nat. Sci. Phila., VII, 1854–55, p. 176.—Stimpson, Bost. Jour. Nat. Hist., VI, 1857, p. 505.
Armadillo affinis Budde-Lund, Crust. Isop. Terrestria, 1885, p. 39.
Cubaris affinis Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 865.

Locality. —California.

Body superficially smooth and uniform; antennæ very finely rather scabrous, the last two articles together (the sixth and seventh) scarcely

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[a] Proc. Zool. Soc. London, 1877, p. 666.

shorter than the fifth. The last abdominal segment a little transverse, constricted in the middle. The uropoda wide, not longer than the width at the base, with the inner posterior angle widely excavated, the anterior, posterior, and external sides almost straight and rectangular, the inner anterior angle truncate, the outer anterior angle rounded, posterior branch minute, scarcely projecting. Length, 4½ lines."[a]

CUBARIS ZIGZAG (Dollfus).

Armadillo zigzag Dollfus, Proc. Zool. Soc. London, 1896, pp. 394–395.
Cubaris zigzag Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 572.

Locality.—St. Vincent, West Indies. Forest, damp ground under rubbish, 1,000 feet.

"Body convex, smooth. Cephalon: prosepistoma plain, fore edge nearly straight. Eyes small; about 12 ocelli. Antennæ short; first joint of the flagellum twice as short as the second. Pereion: first segment with a slightly perceptible antero-median tubercle; edges hardly raised; coxopodite distinct on the entire length of the edge (underside), not divergent. Coxopodite of the second segment narrowly quadrangular. Pleon, telson: pleotelson as wide as long; sides feebly curved; apex with rounded angles, half as wide as the basis. Uropoda: basis oblique, endopodite reaching to one-half the length

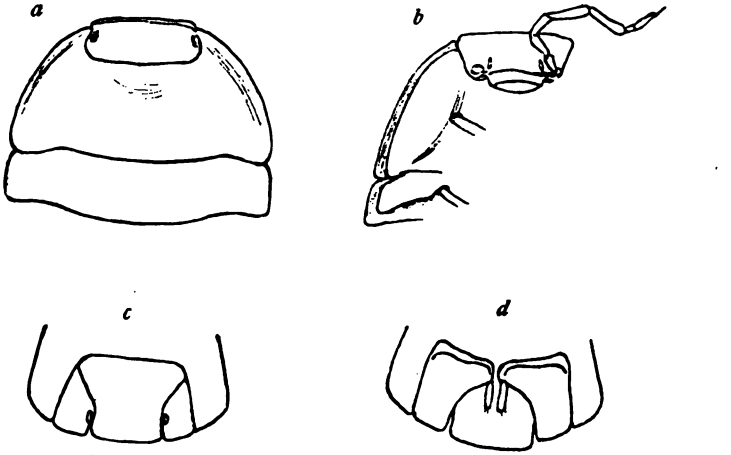

Fig. 692.—Cubaris zigzag (After Dollfus). *a*, Head and first two segments of thorax (upperside). *b*, Head and first two segments of thorax (underside). *c*, Fifth and sixth segments of abdomen and uropoda (upperside). *d*, The same (underside).

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[a] The above description is adapted from the following one of Dana's:

Corpus superficie læve et innotatum. Antennæ subtilissime scabriculæ, articulis duobus ultimis conjunctis (6 to 7 moque) 5to parce brevioribus. Segmentum abdominis ultimum paulo transversum, medio constrictum. Styli caudales lati, latitudine basali non longiores, angulo interno-postiore late excavato, lateribus antico postico et externo fere rectis et inter sese rectangulatis, angulo interno-anteriore truncato, externo-anteriore rotundato, ramo posteriore minuto, parce exserto.—Long. 4½ ′′′.—Dana, Proc. Acad. Nat. Sci. Phila., VII, 1854–55, p. 176.

of the pleotelson; exopodite minute, placed near the middle of the internal edge of the basis (upperside). Color: yellowish, with a double median and crinkled lateral lines of dark brown; uropoda pale. Dimensions: 4 by 1⅔ mm." DOLLFUS.[a]

CUBARIS DUMORUM (Dollfus).

Armadillo dumorum DOLLFUS, Proc. Zool. Soc. London, 1896, p. 391.
Cubaris dumorum RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 572.

Locality.—Mustique Island, West Indies. Found by beating brush.

"Body very convex, nearly smooth. Cephalon: prosepistoma nearly plain, fore edge straight. Eyes large; about 20 ocelli. Antennæ very short; first joint of flagellum twice as short as the second. Pereion: first segment with a blunt antero-median tubercle; lateral edges raised on the fore part; coxopodite separated by a cleft extending to the third hind part of the segment (underside). Second segment with a square coxopodite, distinct on its total length (underside). Pleon, telson: pleotelson quite as long as wide; sides curved; apex one-third narrower than the basis. Uropoda: basis wide, oblique; endopodite extending to one-third the length of the pleotelson; exopodite very small, placed near the middle of the internal edge of the basis (upperside). Color: dark gray or brown, with light dots and lineolæ on both sides of the median line (pereion). Dimensions: 8 by 3½ mm." DOLLFUS.[b]

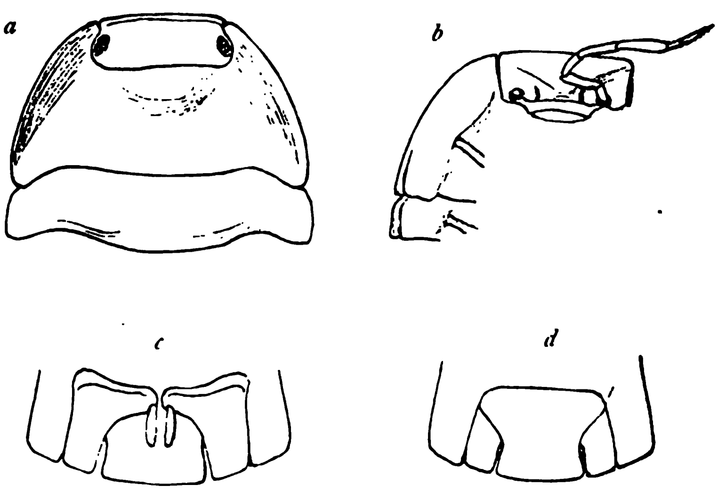

FIG. 633.—CUBARIS DUMORUM (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO SEGMENTS OF THORAX (UPPER SIDE). *b*, THE SAME (UNDERSIDE). *c*, FIFTH AND SIXTH SEGMENTS OF ABDOMEN WITH UROPODA (UPPER SIDE). *d*, THE SAME (UNDERSIDE).

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[a] Proc. Zool. Soc. London, 1896, pp. 394–395.
[b] Idem, p. 391.

CUBARIS GRENADENSIS (Budde-Lund).

Armadillo grenadensis Budde-Lund, Entomol. Meddelel., IV, 1893, p. 115.—Dollfus, Proc. Zool. Soc. London, 1896, pp. 392-393.
Cubaris grenadensis Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 572.

Localities.—Becquia Island; Grenada; Balthazar, West Indies. Ravine, damp ground, under rotting leaves; 250-feet cocoa orchard, under rotting leaves.

"Body much convex, nearly smooth. Cephalon: prosepistoma slightly convex, fore edge feebly arched in the middle. Eyes rather large; ocelli about 16. Antennæ short; first joint of the flagellum three times shorter than the second. Pereion: first segment with a blunt antero-median tubercle; lateral edges raised; coxopodite distinct and divergent on the half hind part of the edge (underside). Coxopodite of the second segment forming a toothlike processus. Pleon, telson: pleotelson as wide as long, with a blunt double tubercle near its basis; sides curved; apex nearly as wide as the basis; endopodite reaching to two-thirds the length of the pleotelson; exopodite minute, placed near the middle of the internal edge of the basis. Color: dark gray, with a light median line and light lineolæ on the sides; antennæ whitish. Dimensions: 14 by 6 mm."—Dollfus.[a]

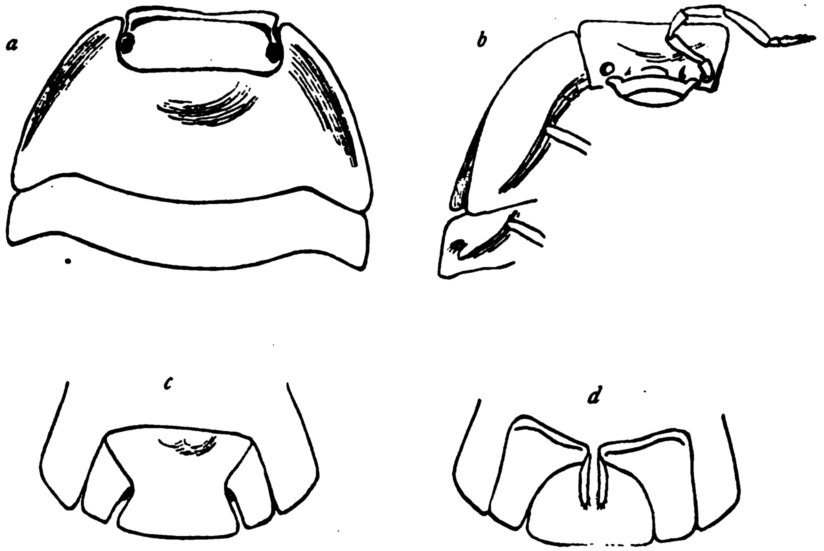

Fig. 694.—Cubaris grenadensis (after Dollfus). *a*. Head and first two segments of thorax (upper side). *b*. The same (underside). *c*. Fifth and sixth segments of abdomen and uropoda (upper side). *d*. The same (underside).

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[a] Proc. Zool. Soc. London, 1896, pp. 392-393.

CUBARIS DUGESI (Dollfus).

Armadillo dugesi Dollfus, Bull. Soc. Zool. France, XXI, 1896, p. 47.

Localities.—Corritos and Morelia, Mexico.

Body narrow, convex, smooth, very finely punctate and setaceous. Head: Prosepistome extending a little beyond the front, especially on the two sides, surface flat; eyes small, about 14 ocelli; flagellum of the antennæ with the first article half as long as the second. Thorax: lateral margin of the first segment elevated along its entire length; antero-median mamelon scarcely visible; coxopodites distinct only on the posterior third part of the side of the segment, but reaching to the extremity of it. Second segment with the coxopodite very distinct. Pleon, telson: pleotelson as long as wide, with a little relief, followed by an impression, situated near the base; the lateral incurvation well indicated; the apex equal to about three-fourths of the base in size. Uropoda with the basal article a little oblique; the inner branches very small; the outer branches very small, situated about two-thirds of the inner side of the base (superior side). Color uniformly dark gray. Dimensions: Length 8 mm.; width 3½ mm.[a]

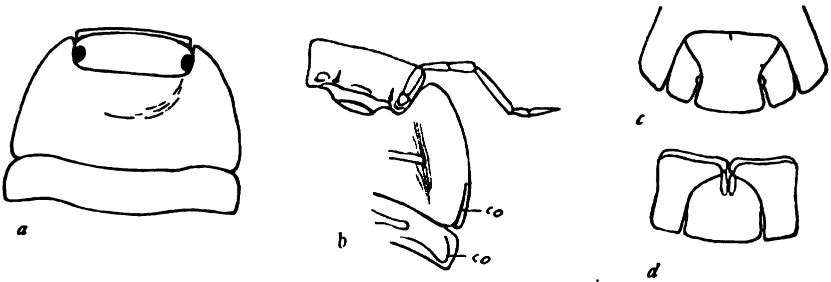

FIG. 695.—CUBARIS DUGESI (AFTER DOLLFUS). *a*, HEAD AND FIRST TWO THORACIC SEGMENTS (DORSAL VIEW). *b*, HEAD WITH ANTENNA AND FIRST TWO SEGMENTS OF THORAX WITH COXOPODITES (*co* AND *co'*) (VENTRAL VIEW). *c*, FIFTH AND SIXTH ABDOMINAL SEGMENTS AND UROPODA (DORSAL VIEW). *d*, SIXTH ABDOMINAL SEGMENT AND UROPODA (VENTRAL VIEW).

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[a] The above description is adapted from the following one of Dollfus's:

Corps étroit, convexe, lisse, très finement ponctué-sétacé. Cephalon: prosépistome dépassant un peu le front, surtout des deux côtés, face plane; yeux petits, environ 14 ocelles; fouet des antennes à premier article deux fois plus court que le second. Pereion: bord latéral du premier segment relevé sur toute sa longueur; mamelon antéro-médian à peine visible; coxopodites distincts seulement sur le tiers postérieur du côté du segment, mais atteignant à l'extrémité de celui-ci. Deuxième segment à coxopodite très distinct. Pleon, telson: pleotelson aussi long que large, avec un petit relief suivi d'une impression, situé près de la base; incurvation latérale bien indiquée; le sommet égal en largeur environ les ¾ de la base. Uropodes à article basilaire peu oblique; endopodites très petits; exopodites minuscules, situés vers les ⅔ du côté interne de la base (face supérieure). Couleur: gris foncé uniforme. Dimensions: longueur, 8 millimètres; largeur, 3½ millimètres.—Dollfus, Bull. Soc. Zool. France, XXI, 1896, p. 47.

CUBARIS PISUM (Budde-Lund).

Armadillo pisum Budde-Lund, Crust. Isop. Terrestria, 1885, p. 32.
Cubaris pisum Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 572.

Locality.—Florida.

Body oval, very convex, smooth, shining.

Second pair of antennæ a little shorter than half the length of the body, slender; first article of the flagellum one-third as long as the second. Eyes moderately large, with about fifteen ocelli.

Clypeus with the lobes short and widely rounded; epistome with the superior margin curved, hardly extending beyond the front of the head; front and top of the head smooth.

The first segment of the thorax with the lateral margin with a high crest, posteriorly less high and sub-equally cleft, the inner part being a little smaller; the epimera of the second segment cleft, the inner part the smallest. The posterior margins of the segments slightly sinuated on both sides. The terminal segment of the abdomen is a little wider than long, scarcely compressed in the middle, posteriorly truncate, convex above. The basal article of the uropoda is longer than wide, for a short time narrower at the apex; outer branch very small, in the form of a little point, inserted near the apex; inner branch short.

Color, uniformly brown or reddish brown. Length, 4.5 to 5.5 mm. Width, 2.5 to 3 mm.[a]

CUBARIS CALIFORNICA (Budde-Lund).

Armadillo speciosus Stuxberg, Øfversigt af Vetensk. Akad. Forhandl., 1875, No. 2, p. 62.
Armadillo californica Budde-Lund, Crust. Isop. Terrestria, 1885, p. 40.
Cubaris californica Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 865; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 333; American Naturalist, XXXIV, 1900, p. 305.

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[a] The above description is adapted from the following one of Budde-Lund's:

Ovalis, valde convexus, lævis, glaber, subnitidus.

Antennæ exteriores dimidio corporis paulo breviores, gracilis; flagelli articulus prior altero triplo brevior.

Oculi mediocres; ocelli circiter 15.

Clypeus lobis brevibus, late rotundatis; epistoma margine superiore curvato, frontem vix superante; frons et vertex lævia.

Trunci annulus primus margine laterali altecincto, post minus profunde et subæqualiter fisso, parte interiore paulo minore; epimera annuli secundi fissa, parte interiore minima. Margo posterior annulorum leviter utrinque sinuatus.

Caudæ annulus analis paulo latior quam longior, medio vix coarctato, post recte truncatus, supra convexus. Articulus basalis pedum analium paulo longior quam latior, ad apicem paulisper angustatus; ramus exterior minutissimus, punctiformis, apici proprius insertus; ramus interior brevis.

Color brunneus vel rufobrunneus, uniformis.

Longitudo 4.5–5.5 mm., latitudo 2.5–3 mm.—Budde-Lund, Crust. Isop. Terrestria, 1885, p. 32.

Localities.—California at San Francisco and San Pedro.

Budde-Lund suggests that this species may be identical with *Cubaris affinis* Dana.

Inasmuch as the specific name *speciosus* is applied by Dana to another species of *Cubaris*, Budde-Lund suggests for this form the specific name *californica*.

Body ovate, very convex, smooth and shining. Second antennæ with the second article three times longer than the first, the fifth article straight, cylindrical, very long; flagellum with the articles unequal in length, the first one one-fourth as long as the second. The first four segments of the thorax with the posterior margin slightly sinuate on both sides, the three last segments very slightly sinuate. The epimera are moderately large, with the anterior angles obliquely truncate, the posterior angles of the first segment straight, roundly rectangular, with the margin sulcate; those of the second, third, fourth, and fifth segments gradually less widely rounded; those of the sixth and seventh straight, rounded. The last segment of the abdomen by no means equal in width to the length. Color of the dorsal surface gray, with a median line and a lateral series of large light spots on the epimera of the segments of the body. Head very thickly spotted with light spots. Abdomen gray, with the third segment bipunctate. Length 5.5 mm.; width 3 mm.[a]

117. Genus PSEUDARMADILLO Saussure.

Frontal margin of head produced in three processes, one median and two lateral. Second pair of antennæ with the flagellum composed of two articles, the first one of which is much shorter than the second. Coxopodites present on the under side of the first two segments of the thorax. Terminal segment of the body triangular in shape, with the apex produced in a truncate process. Basal article of uropoda large, filling the space between the lateral parts of the fifth abdominal and the terminal abdominal segments and continuing the oval outline of

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[a] The above description is adapted from the following one of Stuxberg's:

Armadillo ovalis, valde convexus, lævis, subnitidus.

Antennæ exteriores articulo secundo triplo longiore quam primo, quinto recto, cylindrico, longissimo, flagelli articulis inæqualibus, interiore quadruplo breviore quam exteriore.

Trunci segmenta quattuor priora margine postico utrinque leviter, posteriora tria levissime sinuata. Epimera medioeria, angulis anticis oblique truncatis, angulis posticis primi segmenti subrectis, rotundate-rectangulis, margine sulcatis, secundi, tertii, quarti, quinti minus minusque late rotundatis, sexti et septimi subrectis, rotundatis.

Caudæ segmentum ultimum latitudine minima longitudinem assequente.

Color dorsi griseus, linea mediana serieque macularum majorum laterali et epimeris segmentorum trunci pallidioribus. Caput creberrime pallide punctulatum. Cauda grisea, segmento tertio bipunctato. Longitudo 5.5 mm., latitudo 3 mm.—Stuxberg, Øfversigt af Vetensk. Akad. Forhandl., 1875, No. 2, p. 62.

the body. The outer branch is minute and is placed at the inner posterior angle of the basal article. The inner branch is only visible from a ventral view, and extends the length of the basal segment on the under side, being attached to the upper inner angle.

The first two segments of the thorax have the epimera posteriorly cleft.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS PSEUDARMADILLO.

a. Thorax armed with two longitudinal rows of long spines. Fifth abdominal segment armed with a long stout spine........*Pseudarmadillo gillianus* Richardson
a'. Thorax not armed with two longitudinal rows of long stout spines. Fifth abdominal segment not armed with a long stout spine.
  b. Coxopodites of the first thoracic segment ending in a bifurcate process. Two tubercles present in longitudinal series in the median line on the sixth abdominal segment. Tubercle on the fifth thoracic segment largest.
    Pseudarmadillo dollfusi, new species
  b'. Coxopodites of the first thoracic segment not ending in a bifurcate process. One tubercle only present in the median line of the sixth abdominal segment. Tubercle of the sixth abdominal segment largest.
    Pseudarmadillo carinulatus Saussure [a]

PSEUDARMADILLO GILLIANUS Richardson.

Pseudarmadillo gillianus RICHARDSON, Proc. U. S. Nat. Mus., XXV, 1902, pp. 509–511.

Locality.—Isla de Pinos.

Body strongly and thickly tuberculate. The thorax is armed with two longitudinal rows of long stout spines, each row being halfway between the median line and the lateral margin. On the seventh thoracic segment, however, the spines are closer together and are much longer. A long median spine is present on the fifth abdominal segment.

The head has the anterior margin produced in three lobes, a median lobe, which is broad and roundly truncate, and two lateral lobes, broadly rounded. The posterior portion of the head bears four prominent tubercles in a transverse series, the two outer ones being much larger and stouter, with broad bases. The eyes are black and distinct and are situated post-laterally. The antennæ reach the middle of the first thoracic segment; the flagellum is two-jointed, the proximal joint being three or four times shorter than the distal one.

The first thoracic segment is covered with small tubercles, except at the sides. The posterior portion of the lateral part of the segment is produced backward a little, the post-lateral angulation being rounded.

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[a] In redescribing *Pseudarmadillo carinulatus* Saussure, Budde-Lund says there is a single median tubercle on the 4–5–6 abdominal segments, all large. He does not mention the presence of one on the third abdominal segment, although Saussure says
wing the first two. In describing the epimera of
d does not say that they terminate on each side

The lateral border is curved upward, forming a slight concavity. On either side of the segment halfway between the median line and the lateral margin, and on the posterior part of the segment, is a long stout spine, directed backward. The coxopodites are distinct the entire length of the first segment on the under side and each is in the form of a ridge, ending in a bifurcate tooth-like process. The second thoracic segment has the coxopodites of the under side in the form of tooth-like processes. The lateral spines of the second, third, fourth, fifth, and sixth segments form two longitudinal series, one on either side of the median line, halfway between that and the lateral margin, and in line with those of the first segment. The spines of the seventh thoracic segment are, however, much closer together and are also much longer. The seventh segment is produced backward about the center, so that it is longer at that point than at the sides. The lateral portions of the second, third, fourth, and fifth segments are drawn out in narrow rounded processes, slightly curving upward at their extremities. The sixth and seventh segments have the lateral portions drawn out in processes which are somewhat truncate at their extremities. All these segments are thickly tuberculate except at the sides and on the anterior portion, where the segment articulates with the one immediately anterior to it.

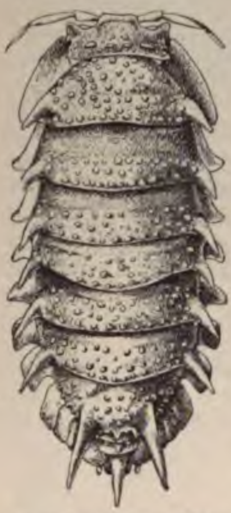


FIG. 696.—PSEUDARMADILLO GILLIANUS. × 5.

The first two segments of the abdomen are concealed by the last thoracic segment. All the abdominal segments are tuberculate. One tubercle in the median line of the third segment is somewhat enlarged and more prominent than the others. One tubercle in the median line of the fourth segment is slightly more enlarged than the tubercle of the preceding segment. A long stout spine directed backward is present on the fifth abdominal segment in the median line. At the base of the terminal segment is a large prominent tubercle, very much larger than those of the third and fourth abdominal segments. The terminal segment is triangularly shaped, with the apex produced in a truncate process. The basal segment of the uropoda, seen from the dorsal side, is large, wider at the base than at the apex, filling the space between the lateral process of the fifth abdominal and the terminal abdominal segments, and continuing the oval outline of the body. The outer branch is very small and is inserted at the posterior angle of the basal joint. The basal joint, seen from the under side, is

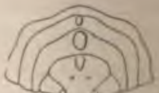


FIG. 697.—PSEUDARMADILLO GILLIANUS. ABDOMEN. × 5.

The first thoracic segment is nearly twice as long as the second, and is densely and thickly covered with tubercles, except on the lateral parts, which are produced backward in rounded expansions. The following five segments are subequal and densely covered with tubercles. The seventh segment is a little longer than any of the preceding five segments and has two tubercles, a little larger than any of the other numerous tubercles on its surface, situated on the posterior margin, one on either side of the median line. The coxopodites are not evident from above on any of the segments. On the first two they are present on the under side, being represented in the first segment by a longitudinal raised carina or ridge extending the full length of the segment and terminating in a bifurcate process. On the second segment the coxopodites are also in the form of raised carinæ or ridges extending the length of the segment. In the second, third, and fourth segments the lateral margins of the segments are drawn out in narrow processes terminating laterally in rounded extremities. The lateral margins of the last three segments are straight. There is one tubercle on either side of each segment on the posterior margin about halfway between the median line and the lateral margin, which is a little larger than any of the others, those of the sixth segment being most prominent. A faintly raised line crosses transversely the lateral parts of all the segments, with the exception of the first, about the middle.

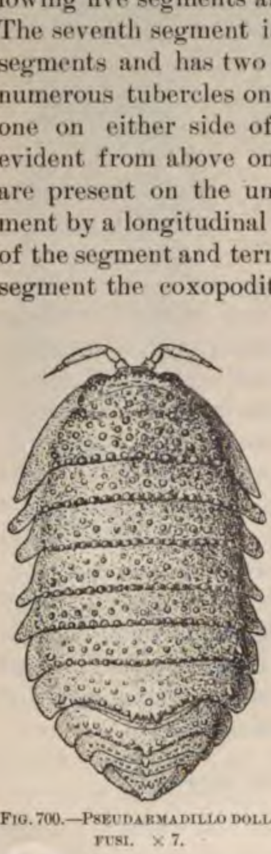
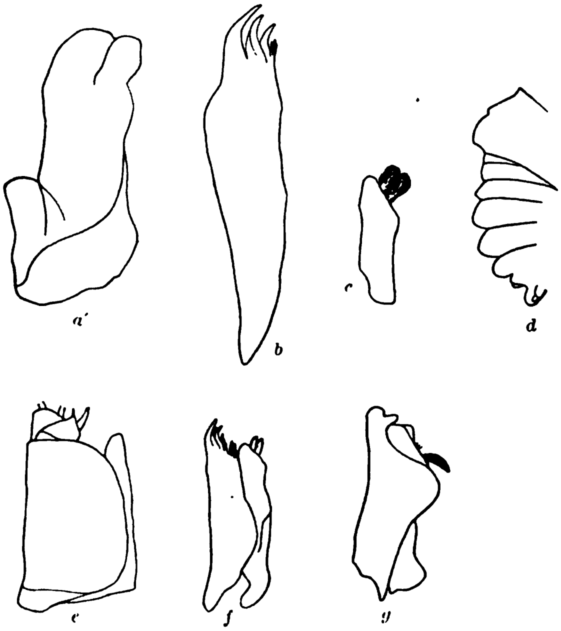


FIG. 700.—PSEUDARMADILLO DOLLFUSI. × 7.

The abdomen is composed of six segments, the first two of which are smooth and short, and covered laterally by the seventh thoracic segment. The third, fourth, and fifth segments are subequal and are covered with tubercles, on each of which is a larger and more conspicuous tubercle in the median line, the tubercles in the series increasing in size from the first to the last, and compressed laterally, and in a lateral view having the upper surface rounded. The terminal segment is triangular, with the apex produced in a truncate extremity. There are numerous tubercles on its dorsal surface, one in the median line being larger than the others; it is as large as the median tubercle on the fourth segment. Posterior to it are two small tubercles, one on either side of the median line. The peduncle of the uropoda is in the form of a large plate, almost rectangular when seen from below, but from a dorsal view being long and narrow and lying close to the terminal abdominal segment and continuing the oval outline of the body. It reaches almost to the extremity of the terminal abdominal segment, branch is minute and is placed at the inner post-lateral angle luncle. The inner branch can only be seen from the under e it is inserted at the upper inner angle of the peduncle, and he length of the peduncle, but does not quite reach the of the terminal abdominal segment.

pecimens of this species were collected by the Bahama expeigust 1, 1904, at Mangrove Cay, Andros.

ecies differs from *P. carinulatus* Saussure in having the



UDARMADILLO DOLLFUSI. *a*, SECOND MAXILLA. × 51⅓. *b*, OUTER LAMELLA OF FIRST × 51⅓. *c*, INNER LAMELLA OF FIRST MAXILLA. × 51⅓. *d*, LATERAL VIEW OF ABDOMEN IORACIC SEGMENT. × 9⅓. *e*, MAXILLIPED. × 27⅓. *f*, FIRST MAXILLA. 27⅓. *g*, MAN-7⅓.

f the first thoracic segment ending in a bifurcate process, in the median line on the terminal abdominal segment one ollowed by two in a transverse series instead of one, in havbercle on the fifth segment of the abdomen largest, and in the tubercles of the seventh thoracic segment "triquetres." es are in the Museum of Comparative Zoology at Harvard y. Cat. No. 6731.

ecies is named in honor of Prof. Adrien Dollfus, who has work on the terrestrial isopods.

PSEUDARMADILLO CARINULATUS Saussure.

Pseudarmadillo carinulatus SAUSSURE, Revue et Magasin de Zoologie (2), IX, 1857, p. 308; Mém. de la Soc. de Physique et d'Hist. nat. de Genève, XIV, 1858, Pt. 2, p. 483, pl. v, figs. 43–43a.—BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 41–42.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 572.

Locality.—Mexico or Cuba.

Body rugose, tuberculated; the last segment of the thorax strongly tuberculated; abdomen ornamented with a median series of tubercles.

Inferior margin of the head forming three rounded lobes, projecting in front, the median one of which is the largest and a little more in advance of the lateral ones, which are obliquely directed. The uropods are rather deformed. Their second article, seen from below, presents near the base a kind of transverse ridge; it becomes larger toward the end and terminates in a large border, the two extremities of which are rounded instead of forming angles. The inner margin of this article is thickened, in such a way as to offer a small surface somewhat excavated, and separated from the inner surface by a prominent, distorted ridge. At the base of this surface one sees a little lamella attached to it, which is probably the inner branch of the uropoda. Above, the second article appears in the form of a band, which is placed along the lateral margin of the segment; this band is a little distorted and elevated above, especially at its anterior extremity, where it is also a little larger; at its posterior extremity it forms an angle, which is the inner angle of the margin of the uropoda, to which is articulated the third article, which is very small The last abdominal segment is in the form of a truncated triangle, not extending beyond the extremity of the uropoda, and which is separated from them a little; its lateral margins are not straight, but a little sinuated. The body is very rough, all covered with little tubercles, rugose. The head is bordered anteriorly with a transverse elevation furnished with a line of tubercles. The first thoracic segment is all covered with rugosities, except at the sides, which are produced backward in the form of a large rounded process, the inferior margin of which is elevated in such a way as to form a concave surface. The other segments are entirely rugose, except on the anterior half, which is smooth for articulation; their inferior extremities are produced backward in the form of narrow processes, a little elevated, less rugose, and carrying abo

a projecting longitudinal line, which is still to be seen on the th

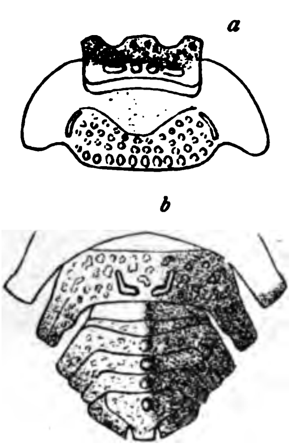


FIG. 702.—PSEUDARMADILLO CARINULATUS (AFTER SAUSSURE). *a*, HEAD AND FIRST SEGMENT OF THORAX. *b*, ABDOMEN AND URO-PODA. (ENLARGED.)

ninal segment. The last thoracic segment is armed above with
arge tubercles "triquètres," directed backward. The abdomen
gose and made in the form of a roof; the first two segments are
npletely visible; the following ones are all armed in the middle
a strong tubercle, the last of which, placed at the base of the
nal segment, is the largest. Color, a uniform grayish-brown.
th, 0.010 m.[a]

118. Genus SPHÆRONISCUS Gerstæcker.

st pair of antennæ very small, inconspicuous, composed of three
es. Second pair of antennæ short; flagellum composed of three
es.

es small, composite, composed of about ten ocelli. Clypeus
ght, not lobate. Epistome flat, forming a continuous frontal
inal line. Vertical marginal line reaching the frontal margin.
st segment of the thorax usually with the epimera posteriorly cleft.

---

e above description is adapted from the following one of Saussure's:
osus, tuberculatus; thoracis segmentum ultimum valde bituberculatum; abdomen
ediana tuberculorum ornatum.
l inférieur de la tête formant trois lobes arrondis, saillants en avant, dont le
n est le plus large et un peu plus avancé que les latéraux, lesquels sont dirigés
ement. Dernières fausses-pattes abdominales assez difformes. Leur deuxième
vu en dessous, offre, près de la base, une espèce de crête transversale; il s'élargit
bout et se termine par un large bord dont les deux extrémités s'arrondissent
n de former des angles. Le bord interne de cet article est épais, de façon à
une petite face un peu creusée, séparée de la face inférieure par une crête
et tranchante. A la base de cette face on voit une petite lame accolée contre
ui est probablement l'appendice interne des fausses-pattes. En dessus, le
me article apparait sous la forme d'une bande qui longe le bord latéral du
nt; cette bande est un peu tordue et relevée en haut, surtout à son extrémité
eure, où elle est aussi un peu plus large; à son extrémité postérieure elle
un angle qui est l'angle interne du bord des fausses-pattes, sur lequel est
é le troisième article, qui est très-petit. Dernier segment abdominal en forme
ngle tronqué, ne dépassant pas le bout des fausses-pattes lequel s'en écarte un
es bords latéraux n'étant pas droits mais un peu sinués. Corps très-raboteux,
ouvert de petits tubercules rugueux. La tête étant bordée supérieurement par
ninence transversale garnie d'une ligne de tubercules. Premier segment
ique tout couvert de rugosités sauf sur les côtés, qui sont prolongés en arrière
me de large apophyse arrondie, et dont les bords inférieurs sont relevés, de
à former une surface concave. Les autres segments, entièrement rugueux,
ans leur moitié antérieure, qui est lisse, pour l'articulation; leurs extrémités
ures sont prolongées en arrière en forme d'apophyses étroites, un peu relevées,
rugueuses et portant en dessus une ligne saillante longitudinale, qui se voit
sur le troisième segment abdominal. Dernier anneau thoracique armé en
des deux gros tubercules triquètres, dirigés en arrière. Abdomen rugueux,
en forme de toit; ses deux premiers segments incomplétement visibles; les
ts tous armés au milieu d'un fort tubercle, dont le dernier, placé sur la base
ment anal, est le plus grand. Couleur d'un gris-brun uniforme. Longueur,
n.—SAUSSURE, Mém. de la Soc. de Physique et d'Hist. nat. de Genève, XIV,
Pt. 2, p. 483.

Terminal segment of abdomen very short, usually triangular. Outer branch of all the pleopoda furnished with tracheæ. Uropoda extending beyond the terminal abdominal segment; the basal article large, triangular, entire; the outer branch small, rather slender, inserted at the inner post-lateral angle of the basal article; outer branch long, rather slender, a little compressed.[a]

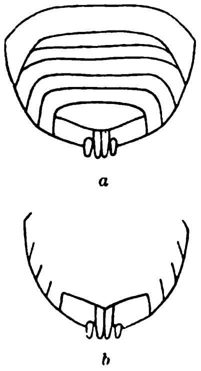


FIG. 703.—SPHÆRONISCUS PORTORICENSIS. *a*, ABDOMEN. *b*, UROPODA (INSIDE).

ANALYTICAL KEY TO THE SPECIES OF THE GENUS SPHÆRONISCUS.

a. Body smooth. Terminal segment of abdomen broad and posteriorly rounded, not constricted. First thoracic segment without distinct coxopodites.
Sphæroniscus portoricensis Richardson

a′. Body covered with little transverse rugæ. Terminal segment of abdomen strongly constricted in the middle and somewhat enlarged toward the outer border. First thoracic segment with a tooth-like lobe on the sides anteriorly (coxopodites?).
Sphæroniscus cacahuamilpensis (Bilimek)

SPHÆRONISCUS PORTORICENSIS Richardson.

Sphæroniscus portoricensis RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 573.

Locality.—El Yunque, Porto Rico, at an altitude of 2,800 feet.

Body oblong, very convex, contractile into a ball. Surface perfectly smooth. Head set in first thoracic segment; front straight; epistoma forming a triangular shield. Eyes very small. Antennæ with flagellum composed of three joints.

First thoracic segment twice as long as head, and longer than any of the other segments. Coxopodites not distinct from segment.

First two abdominal segments with the lateral parts concealed, the three following ones continuing the outline of the body. The terminal segment is twice as broad as long, very short, widely rounded posteriorly. The basal joints of the uropoda are large,

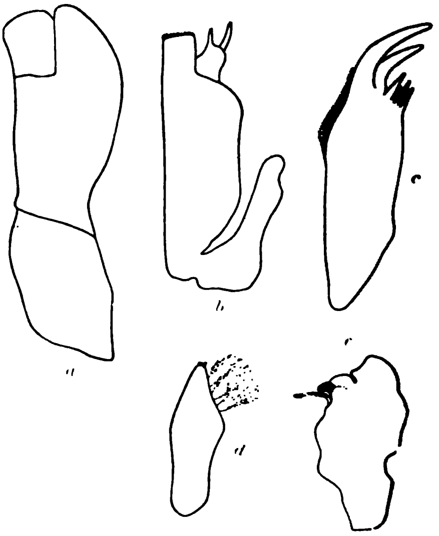


FIG. 704.—SPHÆRONISCUS PORTORICENSIS. *a*, SECOND MAXILLA. × 51⅓. *b*, MAXILLIPED. × 27⅓. *c*, OUTER LAMELLA OF FIRST MAXILLA. × 51⅓. *d*, INNER LAMELLA OF SAME.[b] × 51⅓. *e*, MANDIBLE. × 27⅓.

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[a] See Budde-Lund for characters of genus, Crustacea Isopoda Terrestria, 1885, pp. 44–45.

[b] This species differs from all the other Armadillidiidæ in having the inner lobe of the first maxillæ armed with three plumose processes instead of two. I have examined several specimens and find that they agree in this character.

fourth and fifth joint abundantly covered with spines on the inside. The uropoda are thin, twice as long as they are broad; color of feet and antennæ whitish in the dead animal."[a]

119. Genus HAPLARMADILLO Dollfus.

Eyes monocellated. Flagellum of second antennæ composed of a single article. Coxopodites distinct on first thoracic segment. Coxopodites wanting on second segment of thorax.

Terminal segment of abdomen widely triangular.

Basal article of uropoda square, longer than the terminal segment of the abdomen; inner branch as long as the basal article; outer branch minute, inserted at the inner post-lateral angle of the basal article.

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[a] The above description is adapted from the following one of Bilimek's:

Griseo-fuscescens, subtiliter transverse verrucosus; capite transversim dilatato, margine anteriori erecto; primo thoracis segmento latissimo, lobo laterali denti simillimo; abdominis segmento ultimo in medietate valde coarctato; pedibus spuriis angustis, duplo longioribus. Long. 9 mm.; lat. 3½ mm.

Graubräunlich mit feinen Querwärzchen bedeckt. Kopf in die Breite gezogen, 3 mal so breit als lang, Vorderrand breit aufgeworfen, welcher Rand an den Seiten unter den Augen und besonders hinten schwächer wird. Fühler 5-gliedrig mit 3 gliedriger Geissel; Augen aus 14 Punkten zusammengesetzt. 1. Brustkastensegment stark gewölbt, in der Mitte am breitesten, mit einer schwachen Randleiste eingefasst; an den Seiten bildet sich ein zahnartiger Lappen nach vorne zu, vor welchem ein breiter grubenartiger Eindruck vorhanden ist; am Rücken ein flacher Quereindruck. 2. Segment um ⅓ schmäler; die vordere Hälfte der Quere nach eingedrückt von dem darauf sitzenden Vordersegmente; der Lappenfortsatz an den Seiten schmäler werdend, abgerundet, gradaus abwärts gerichtet. 3.–7. Segment von gleicher Beschaffenheit, nur dass der Lappenfortsatz an der Seite immer stumpfer abgestutzt erscheint. 1. Hinterleibssegment ganz schmal, erreicht den Aussenrand nicht; 2.–4. immer schmäler werdend in hufeisenförmiger Gestalt; das 5. mit 2 Seitenlappen eingeschlossen, so lang wie an der Basis breit, in der Mitte stark eingeschnürt und nach dem Aussenrande zu etwas erweitert. Die eigentlichen Füsse 5-gliedrig, das 4. und 5. stark mit Stacheln an der Innenseite besetzt. Afterfüsse schmal, 2 mal so lang als breit; Farbe der Füsse und Fühler im Tode weisslich.

Aufenthalt in der Höhle Cacahuamilpa in Mexico unter Steinen.

Von Pflanzen fand ich einen einzigen Pilz, der auf einer dunklen Unterlage den Rand derselben einfasste, weisslich von Farbe 2–3 mm. gross war; er stand an nassen Stellen auf Kalksinter.—Bilimek, Verhandl. Zool.-Bot. Vereins in Wien, XVII, 1867, pp. 907–908.

HAPLARMADILLO MONOCELLATUS Dollfus.

rmadillo monocellatus Dollfus, Proc. Zool. Soc. London, 1896, p. 400.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 573.

lity.—Richmond Valley, St. Vincent, West Indies. Under rotaves, 1,100 feet.

ody convex, smooth, and covered with minute, setose hair. lon: prosepistoma with a shield-like convexity. Eyes mono-e, hardly perceivable. Antennæ very hairy; flagellum single-jointed, with a long, stiff hair at its distal end. Pereion: first segment with a very blunt antero-median tubercle; hind edge nearly straight; sides feebly raised forward; coxopodite distinct on the posterior half of the edge. Second segment with no distinct coxopodite. Pleon, telson: pleotelson widely triangular, much wider than long. Uropoda with a square basis, longer than the pleotelson; endopodite as long as the basis; exopodite minute, placed at the internal distal angle of the basis. Color: dark gray, variegated with lighter lineolæ and irregular stripes. Dimensions: 9 by 4 mm."—Dollfus.

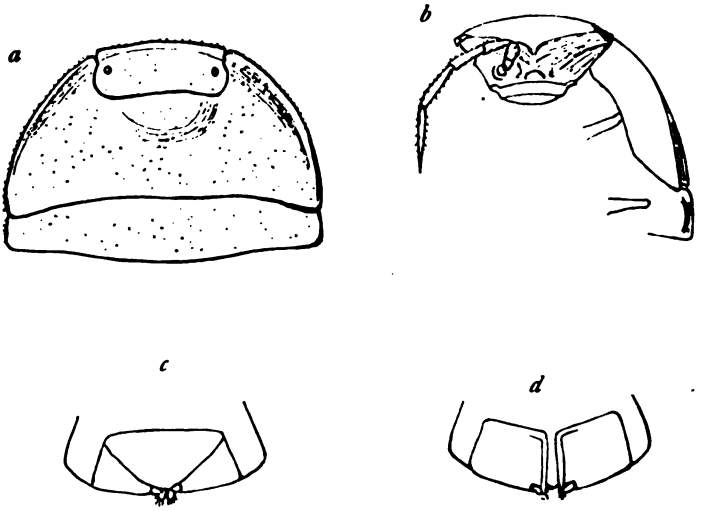

Fig. 705.—Haplarmadillo monocellatus (after Dollfus). *a*, Head and first two segments of thorax (upper side). *b*, The same (underside). *c*, Fifth and sixth segments of abdomen (upper side). *d*, The same (underside).

120. Genus ARMADILLIDIUM Brandt.[a]

First pair of antennæ very small, inconspicuous. Body oblong, very convex, and contractile into a ball.

Front of head marginate, lateral lobes rounded. Epistome vertical, forming a triangular shield, advancing more or less beyond the frontal edge. Clypeus very short, with the anterior margin slightly sinuated in the middle, not lobate. Frontal marginal line interrupted in the middle. Vertical marginal line wanting behind the eyes on both sides. Eyes small or moderately large, distinct, lateral, composite. Second pair of antennæ scarcely equal to half the length of the body; flagellum composed of two articles.

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[a] For characters of genus, see Budde-Lund, Crust. Isop. Terrestria, 1885, p. 49, and O. Sars, Crust. of Norway, II, 1899, p. 188.

First segment of thorax with epimera not cleft posteriorly.

Terminal segment of abdomen quadrangular or triangular in shape, not extending beyond the epimera of the preceding segment.

Opercular plates of the first two pairs of pleopoda furnished with tracheæ.

Uropoda short; basal article broad, obliquely quadrate; outer branch lamellar, flattened; inner branch narrow, cylindrical.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ARMADILLIDIUM.

a. Head truncate in front, without median emargination, and not surpassed by the epistome. Outer branch of the uropoda posteriorly truncate.
Armadillidium vulgare (Latreille)

a′. Head with a small median V-shaped notch in front, and surpassed by the epistome, which extends some distance in front. Outer branch of the uropoda posteriorly rounded.......................*Armadillidium quadrifrons* Stoller

ARMADILLIDIUM VULGARE (Latreille).

Armadillo vulgare Latreille, Hist. Crust., VII, 1804, p. 48; Gen. Crust., I, 1806, p. 71.

Armadillo pilularis Say, Jour. Ac. Nat. Sci. Phila., I, 1818, pp. 432, 433.

Armadillidium commutatum Brandt and Ratzeburg, Med. Zool., II, 1830–1834, p. 81, pl. VIII, figs. 1, 2, 3, A, B.

Armadillo trivialis Koch, Deutschl. Crust., 1835–1844, p. 28.

Armadillo pilularis Gould, Rep. Invert. Mass., 1841, p. 336.—De Kay, Zool. New York, 1844, Pt. 6, Crust., p. 52.

Armadillo ater Schnitzler, De Onisceineis agri Bonnensis, 1853, p. 26.

Armadillidium vulgare Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 66–68 (see Budde-Lund, for synonymy).—Sars, Crust. Norway, II, 1899, pp. 189–190, pl. LXXXII.—Richardson, Amer. Nat., XXXIV, 1900, p. 305; Proc. U. S. Nat. Mus., XXIII, 1901, p. 574.—Chilton, Trans. Linn. Soc. Lond., (2), VIII, Pt. 4, pp. 142–143.—Stoller, 54th Report New York State Museum, 1902, p. 210.—Paulmier, Bull. New York State Museum, 1905, pp. 184–185.

Localities.—Anderson's ferry, Cincinnati, Ohio; Norwood, Ohio; Clifton, Cincinnati, Ohio; Columbus, Ohio; Coney Island, Ohio; Mount Auburn, Cincinnati, Ohio; Redbank, Hamilton County, Ohio; Lexington, Kentucky; Aiken, South Carolina; Harrington Sound, Bermudas; Hamilton, Bermudas; Washington, District of Columbia; Syracuse, New York; Bay Shore, Long Island; Salem, Massachusetts; Charlestown, South Carolina; Providence, Rhode Island; Canton, Mississippi; New Orleans, Louisiana; Lexington, Kentucky; Woodside, Maryland; Fayal, Azores; Orleans villa, Algeria; world-wide in distribution.

Found on floating seaweed; in moist meadows; under stones; in cellars; under boards in damp soil; in hothouses; under rocks.

In New Orleans, Louisiana, this species is reported to be a menace to cucumbers and other vegetables grown in hothouses.

It is also said to be injurious to various plants in Fort Worth, Texas; found on date palms, imported from Algeria, at the Department of Agriculture, Washington, District of Columbia.

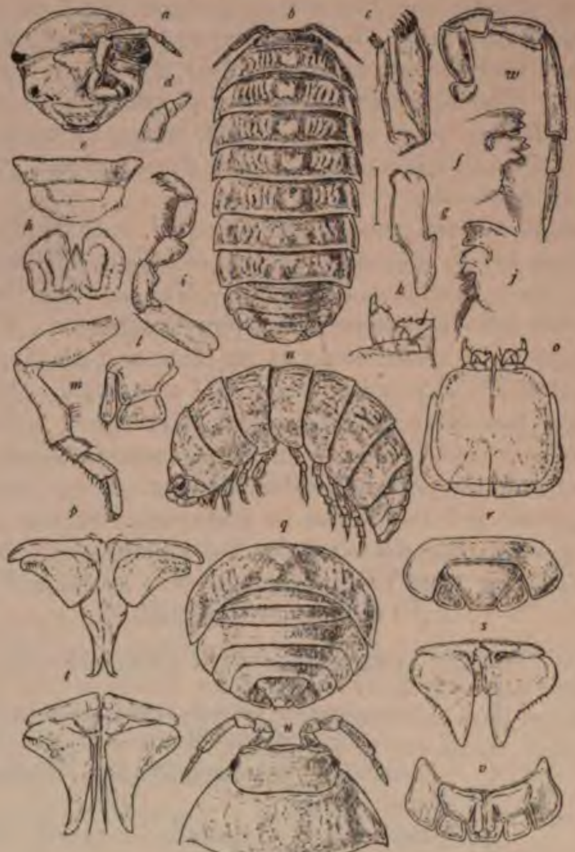

FIG. 706.—*Armadillidium vulgare* (after Sars). *a*, Head with antennæ (ventral view). *b*, Dorsal view of female. *c*, First maxilla. *d*, First antenna. *e*, Anterior lip. *f*, Right mandible. *g*, Second maxilla. *h*, Posterior lip. *i*, First leg. *j*, Left mandible. *k*, Tip of maxilliped. *l*, Uropod. *m*, Seventh leg. *n*, Lateral view of female. *o*, Maxillipeds. *p*, First pleopod of male. *q*, Abdomen with uropoda. *r*, Last two segments of abdomen with uropoda. *s*, Third pleopod of male. *t*, Second pleopod of male. *u*, Head with antennæ (dorsal view). *v*, Abdomen with uropoda (ventral side). *w*, Second antenna.

Also found injuring young cotton near Dallas, Texas.

At Berkley, Virginia, it is reported to be one of the most destructive pests with which the mushroom grower has to deal.

Body oblong-ovate, rather convex, and able to be rolled up into a ball; twice as long as wide; 8 mm.: 16 mm.

Head much wider than long, 1½ mm.: 4 mm., with the front straight. Epistome projects but little beyond the frontal margin The eyes are small, round, composite, and situated in the antero-lateral angles of the head. The first pair of antennæ are rudimentary and inconspicuous and are composed of three articles. The second pair of antennæ have the first article short; the second is about four times as long as the first; the third is about half as long as the second; the fourth is one and a half times longer than the third; the fifth is twice as long as the fourth. The flagellum is composed of two nearly equal articles. The second antennæ extend to the posterior margin of the first thoracic segment. The maxillipeds have a palp of three articles. The palp of the mandibles is wanting.

The segments of the thorax are subequal, each being 2 mm. in length. There are no epimera separated off on any of the segments.

The abdomen is as wide as the thorax. The first two segments are covered at the sides by the seventh thoracic segment. The sixth or terminal segment is 2 mm. wide at the base and 1½ mm. long. It tapers to a truncate extremity, which is 1 mm. wide. The uropoda are not longer than the terminal segment of the body. The peduncle is not visible in a dorsal view. The outer branch is broad and fills in the space between the sixth abdominal segment and the lateral part of the fifth segment; it is truncate at its posterior extremity. The inner branch is narrow and elongate, but does not extend beyond the extremity of the abdomen.

All the legs are ambulatory.

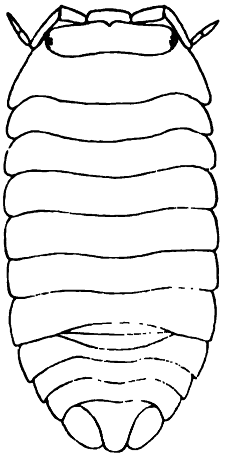

FIG. 707.—ARMADILLIDIUM QUADRIFRONS (AFTER STOLLER). × 5½.

ARMADILLIDIUM QUADRIFRONS Stoller.

Armadillidium quadrifrons STOLLER, 54th Report of the New York State Museum, 1902, pp. 211–212.

Locality.—Schenectady, New York. Found in greenhouses.

Body ovate, contractile into a ball: nearly twice as long as wide, 5 mm.: 9 mm.

Head nearly three times as wide as long, with a small, median V-shaped notch. The epistome is triangular in shape: the broad, basal part being anterior and projecting in front of the head, giving the head the appearance of having a broad, quadrate median lobe. The eyes are small, composite, and situated in the antero-lateral angles. A groove separates the antero-lateral margin of the head from the antennal lobe, which is large and conspicuous and well rounded. In this groove the antennæ lie. The first pair of antennæ are small and inconspicuous. The second pair have the first article short; the second is twice as long as the first; the third is a little shorter than second; the fourth is equal in length to the second; the fifth is ce as long as the fourth. The flagellum is composed of two long, equal articles. The second antennæ extend to the posterior margin he first thoracic segment.

'he first segment of the thorax is a little longer than any of the owing segments, and has the ero-lateral angles produced ward to surround the head, the post-lateral angles pro- ed backward. The epimera not distinct in any of the ments.

'he first two segments of the omen have the lateral parts ered by the seventh thoracic ment. The three following ments continue the oval out- of the body. The sixth or ninal segment is sub-triangu- with sides a little concave apex rounded. The basal nent or peduncle of the uro- a is not visible in a dorsal v. It is large and somewhat drate. The outer branch occupies all the space between the lateral t of the fifth abdominal segment and the terminal abdominal seg- it. The outer branch is broad posteriorly and well rounded. The er branch extends to the extremity of the outer branch and to extremity of the abdomen.

ll the legs are ambulatory in character.

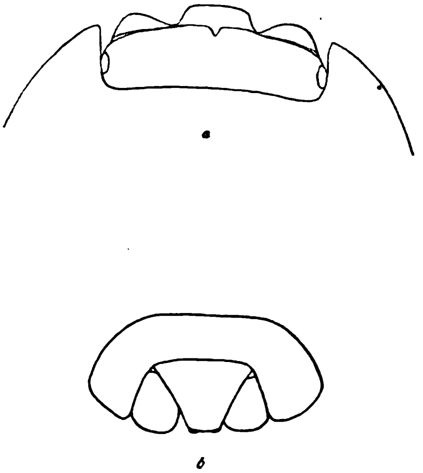

FIG. 708.—ARMADILLIDIUM QUADRIFRONS. *a*, HEAD. × 14⅓. *b*, LAST TWO SEGMENTS OF ABDOMEN WITH UROPODA. × 14⅓.

121. Genus UROPODIAS Richardson.

[ead with the front produced in a prominent rounded lobe. Eyes ll, obscure. External antennæ, with a flagellum of two joints, the nd joint the smaller of the two.

irst six thoracic segments with the lateral parts lamellarly expanded. enth segment as long as the six preceding segments, but with the ral parts undeveloped, and not wider than the first two abdominal nents, which likewise have the lateral parts or epimeral plates eveloped.

bdomen not narrower than the thorax, the lateral parts of the
d, fourth, and fifth expanded and continuing
regular outline al segments equal in
th and half Terminal segment
irangular iced in a medium

rounded lobe. The outer branch of the uropoda is large, broad, flattened, with rounded margins; the inner branch is smaller and narrower, and rounded posteriorly.

There are only six pairs of legs, the appendages of the last thoracic segment being wanting.

UROPODIAS BERMUDENSIS Richardson.

Uropodias bermudensis Richardson, Trans. Conn. Acad. Sciences, XI, 1902, pp. 304–305, pl. xl, figs. 59–60.

Locality.—Castle Harbor, Bermudas, under stones in dry places.

Body very convex, able to be contracted into a ball. Surface smooth. Color uniformly light brown.

Head large, produced in front in a prominent rounded projection. Eyes very small, obscure, and situated about the middle of the lateral margin. The external antennæ, with a flagellum of two joints, extend to the middle of the first thoracic segment, and are geniculate at the articulation of the third and fourth joints.

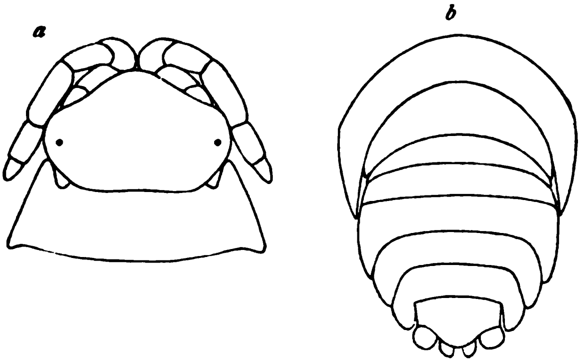

Fig. 709.—Uropodias bermudensis. a, Head and first thoracic segment. × 62. b, Abdomen and last two thoracic segments. × 62.

The thoracic segments are subequal in length. The seventh segment is abruptly narrower than the six preceding segments, and not wider than the first two abdominal segments. The seventh thoracic and the first and second abdominal segments have the lateral parts undeveloped. The first six thoracic and the third, fourth, and fifth abdominal segments have the lateral parts lamellarly expanded, so that the regular outline of the body is preserved, the third abdominal segment not being narrower than the six thoracic segment, the lateral portions of which extend down laterally beyond the seventh thoracic and the first and second abdominal segments.

The terminal abdominal segment is quadrangular, with the posterior margin produced in a median rounded lobe. The uropoda extend but a short distance beyond the lateral parts of the fifth abdominal segment. The outer branch is broad, flattened, and round; the inner branch is smaller and narrower, and posteriorly rounded.

There are but six pairs of legs, those of the seventh thoracic segment being wanting.

A few specimens were collected by Prof. A. E. Verrill and party at the Bermudas in 1898, and at Castle Island in 1901, under stones, in dry places.

Type in the Peabody Museum, Yale University. Cat. No. 3224.

Family XXVII. SCYPHACIDÆ.

Head without median or antero-lateral lobes. Front not margined, but continuous with the epistome. Second pair of antennæ with flagellum composed of four articles. First maxillæ with the inner lobe furnished with two plumose setæ; outer lobe furnished with teeth. Second maxillæ furnished with hairs. Mandibles without molar process. Maxilliped with masticatory lobe acutely produced; palp elongate, much longer than masticatory lobe, with articles large and not distinctly defined.

Abdomen not abruptly narrower than thorax.

Uropoda extending beyond the tip of the abdomen; inner branch inserted at the upper inner angle of the basal article.

122. Genus SCYPHACELLA Smith.

Outer lobe of first maxillæ furnished along the distal half of the inner margin with recurved spines.

Inner lobe furnished with two widely separate plumose processes, one at the tip and the other on the inner margin.

Second maxillæ furnished with hairs at the tip.

Both first and second maxillæ long and slender.

Epignath of maxillipeds long and narrow, acutely produced at the tip.

Eyes large, composed of many ocelli.

Abdomen not narrower than thorax.

Uropoda exposed, both branches styliform.

SCYPHACELLA ARENICOLA Smith.

Scyphacella arenicola Smith, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 567 (274).—Harger with Verrill, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 337 (43).—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 157; Report U. S. Commissioner of Fish and eries, 1880, Pt. 6, pp. 307–308, pl. I, fig. 2.

Trichoniscus arenicola Budde-Lund, Crust. Isop. Terrestria, 1885, p. 249.

Scyphacella arenicola Underwood, Bull. Ill. State Lab. Nat. Hist., II, 18 363.—Richardson, American Naturalist, XXXIV, 1900, p. 307; Proc. Nat. Mus., XXIII, 1901, p. 576.

Localities.—Egg Harbor, New Jersey; Nobska Beach, Vineyard Sound; Nantucket Island; Woods Hole, Massachusetts; mouth of Choptank River, Dorchester County, Maryland. Found in sand.

Body oblong-ovate, a little more than twice as long as wide, 2 mm.: 4½ mm.; surface very scaly, thickly covered with small tubercles, each tipped with a small spine.

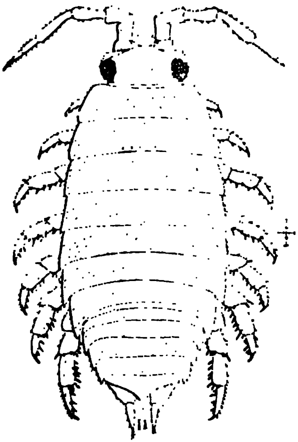

FIG. 710.—SCYPHACELLA ARENICOLA (AFTER HARGER). × 12.

Head wider than long; frontal margin but little produced; lateral lobes small. Eyes large, round, composite, and placed at the sides of the head, close to the lateral margin. The epistome is continuous with the front of the head, so that the head seems to be produced forward in a triangular extremity which is rounded anteriorly. The first pair of antennæ are small, inconspicuous, the terminal article fringed with hairs at the apex. The second pair of antennæ have the first two articles short, the second one a little longer than the first; the third and fourth articles are nearly subequal, and each is a little longer than the second; the fifth is one and a half times longer than the fourth. The flagellum is composed of four articles, the first article being twice as long as the second; the articles are with difficulty to be distinguished. The *antennæ* are thickly beset with spines.

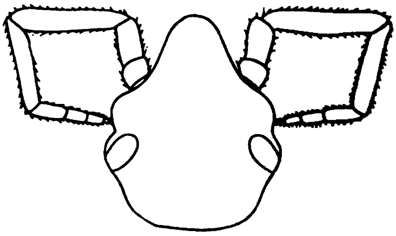

FIG. 711.—SCYPHACELLA ARENICOLA. HEAD WITH ANTENNA. × 27½.

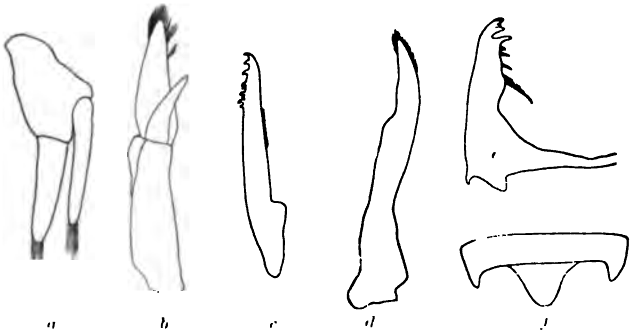

FIG. 712.—SCYPHACELLA ARENICOLA. *a*, UROPOD. × 51⅓. *b*, MAXILLIPED. × 51⅓. *c*, FIRST MAXILLA (OUTER LOBE). × 51⅓. *d*, SECOND MAXILLA. × 51⅓. *e*, MANDIBLE. × 51⅓. *f*, LAST TWO SEGMENTS OF ABDOMEN. × 27⅓.

The segments of the thorax are subequal; the last two have the st-lateral angles produced backward.

All the segments of the abdomen are distinct. The first two have e lateral parts covered by the seventh thoracic seg- ent. The three following segments have the post- teral angles produced backward. The terminal dominal segment is narrow, produced in the middle steriorly in a long, narrow process, broadly rounded the apex. The peduncle of the uropoda extends to e end of the terminal abdominal segment. The anches are of nearly equal length.

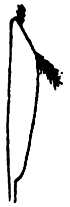
FIG. 713.—SCYPHACELLA ARENICOLA. INNER LOBE OF FIRST MAXILLA. (DIAGRAMMATIC.)

Color of the specimens, for a long time preserved alcohol, dark brown, with the margins of the seg- ents of a lighter brown.

Five specimens were collected by Dr. S. D. Judd in the sand on am Island, Woods Hole, Massachusetts, and are in the collection of e U. S. National Museum.

Family XXVIII. LIGYDIDÆ.[a]

Body oval. Head without lateral lobes; frontal margin rounded, and ot distinctly defined from the epistome. First pair of antennæ with e terminal joint not furnished with sensory hairs. Second pair of itennæ well developed, with flagellum multi-articulate. Buccal mass rominent. Mandibles with the molar process large and broad, having finely fluted triturating surface. Inner lobe of the first maxillæ fur- shed at the tip with three plumose processes. Second maxillæ also rnished inside with two similar processes. Maxillipeds with the lp composed of five articles; masticatory lobe truncate.

Opercular branches of pleopods without tracheæ. First two pairs pleopods modified in male; inner branch terminating in a long stylet.

ANALYTICAL KEY[b] TO THE GENERA OF THE FAMILY LIGYDIDÆ.

Uropoda with basal article not produced in a process at the inner distal angle; branches equal in length. Last segment of abdomen large, with lateral parts well developed..................................Genus *Ligyda* Rafinesque

. Uropoda with basal article produced in a process at the inner distal angle; branches unequal in length. Last segment of abdomen small, with lateral parts obsolete..Genus *Ligidium* Brandt

123. Genus LIGYDA[a] Rafinesque. 1814

Body oval, or oblong oval; abdomen not abruptly narrower than the iorax. Terminal segment broad, with lateral parts well developed. irst pair of antennæ with the third or terminal joint rudimentary, odiform.

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[a] See Sars for characters of family and

[b] The genus *Euphiloscia* Packard is no m of *igidium*.

Second pair of antennæ strong and elongated; flagellum multiarticulate.

Palp of maxillipeds with joints rather expanded; epignath rounded.

Uropoda with the basal article not produced inside at the post-lateral angle; branches subequal, each tipped with a single terminal spine.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS LIGYDA.

a. Uropoda long, equal to two-thirds the length of the body or longer. External antennæ long, extending the entire length of the thorax or longer.
  b. First pair of legs similar to the others in the male....... *Ligyda olfersii* (Brandt)
  b′. First pair of legs in the male differing from the others.
    c. Propodus of first pair of legs armed with a long narrow process at the distal end. Peduncle of second antennæ extends to posterior margin of the third thoracic segment. The second antennæ extend in the male to the end of the body or a little beyond. Body loosely articulated.. *Ligyda exotica* (Roux)
    c′. Propodus of first pair of legs in male unarmed. Merus and carpus in the first pair of legs in the male furnished with a row of bristles or stiff hairs. Peduncle of second antennæ extends to the posterior margin of the second thoracic segment. Second antennæ extend in the male to the end of the thorax. Body compact .... *Ligyda baudiniana* (Milne Edwards)
a′. Uropoda not equal to two-thirds the length of the body.
  b. Uropoda equal to half the length of the body. Terminal segment of the body pointed in the middle .... *Ligyda occidentalis* (Dana)
  b′. Uropoda not equal to half the length of the body. Terminal segment rounded in the middle.
    c. Branches of the uropoda twice as long as the peduncle. Uropoda equal to one-eighth the length of the entire body from the tip of the terminal abdominal segment. Lateral parts of the third, fourth, and fifth segments of the abdomen with distinct carinæ .... *Ligyda pallasi* (Brandt)
    c′. Branches of the uropoda four times as long as the peduncle. Uropoda equal to one-fourth the entire length of the body from the tip of the abdomen. Lateral parts of the third, fourth, and fifth segments of the abdomen without distinct carinæ .... *Ligyda oceanica* (Linnæus)

LIGYDA OLFERSII (Brandt).

Ligia olfersii Brandt, Bull. Soc. Imp. Naturalistes de Moscou, VI, 1833, p. 11.—Budde-Lund, Crust. Isop. Terrestria, 1885, p. 268.—Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, p. 575.

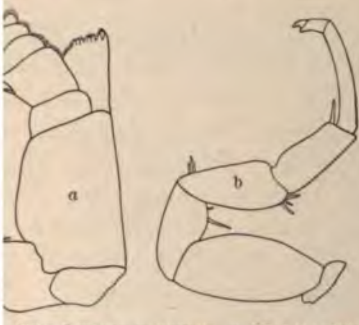
Localities. -Key West and Puntarasa, Florida; St. Thomas; Brazil.

Body oblong-ovate, a little more than twice as long as wide, 7 mm. : 15 mm. Length of uropoda, from tip of terminal segment, 8 mm. Entire length of body with uropoda 23 mm.

Head twice as wide as long, 2 mm. : 4 mm. Anterior margin widely rounded. Eyes composite, narrow, oblong, twice as long as wide, situated on the lateral margins and extending along the anterior margin, being separated in front by a distance a little less than the length of one eye. First pair of antennæ inconspicuous and rudimentary, composed of two subequal articles and a minute terminal one and extending only to the end of the first article of the second pair of antennæ.

first and second articles of the second pair of antennæ are sub- l; the third article is one and a half times longer than the second; fourth is twice the length of the third; the fifth is one and a half s longer than the fourth. The flagellum is composed of twenty- t articles. When retracted, second pair of antennæ extend e end of the fifth abdominal nent. The maxilliped has a of five articles.

he first five segments of the ax are about equal in length; last two are somewhat shorter. posterior angles of the lat- parts of the last three are luced downward. The lateral s of the segments are not sep- ed off from the dorsal portion.



. 714.—Ligyda olfersii. *a*, Maxilliped. 20½. *b*, First leg of male. × 11½.

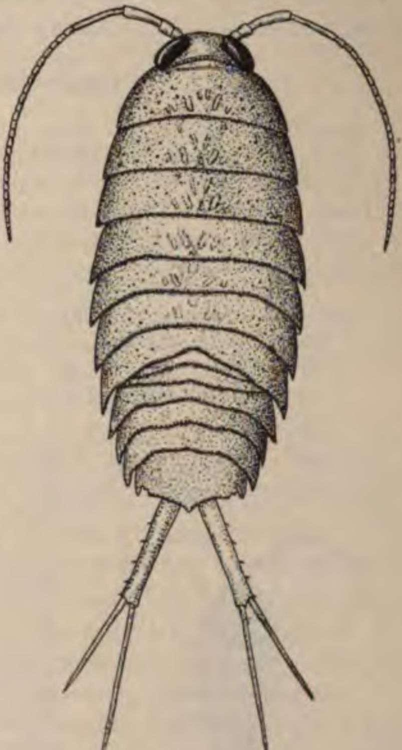


Fig. 715.—Ligyda olfersii. × 3.

re is not even any trace, such as a faint line, to mark the place re coalescence has taken place.

he abdomen is as wide as the thorax, the lateral parts of the d segment extending as far as those of the seventh thoracic seg- t. The lateral parts of the first two segments are not developed. re is a slight and gradual increase in the length of the segments n the first to the fifth. The lateral parts of the abdominal seg- ts are not separated off from the dorsal portion. The middle ion of the sixth or terminal segment is produced triangularly n acute point. The lateral angles are short and acute, and do not nd to the tip of the median point. Between the lateral parts the dorsal portion, there are two angular processes on the poste- margin of the segment, on either side, near the lateral angles, process adjacent to the lateral angle being more obtuse than the r one.

The basal article of the uropoda is 3 mm. in length. The branches are subequal and are 5 mm. long. The legs are all ambulatory. The first pair is not furnished with a process at the distal end of the propodus. The dactylus is bi-unguiculate.

In the female the second antennæ extend only to the posterior margin of the seventh thoracic segment.

LIGYDA EXOTICA (Roux).

Ligia exotica Roux, Crust. Médit., 1828, p. 3, pl. XIII, fig. 9.

Ligia grandis Perty, Delectus animalium articulatorum, etc., 1830–1834, p. 212, pl. XL, fig. 13.

Ligia gaudichaudii Milne Edwards, Hist. Nat. Crust., III, 1840, p. 157.

Ligia (*Italica*) *coriacea* Koch, Deutschlands Crust., 1835–1844, p. 36.

Ligia gaudichaudii Dana, U. S. Expl. Exp., Crust., XIV, 1853, p. 741, pl. XLIX, figs. 6 a–h.—Nicolet, in Gay, Hist. Chile, III, 1849, p. 265.

Ligia exotica Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 266–268.—Dollfus, Bull. Soc. Zool. France, XVIII, 1893, p. 189.—Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 866; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 335; American Naturalist, XXXIV, 1900, p. 306; Proc. U. S. Nat. Mus., XXIII, 1901, p. 575.

Localities.—California; Topolobampo, Mexico; Cedar Keys, Florida; Lake Harley, Florida; Fort Macon, North Carolina; Mazatlan, Mexico; Florida Keys; New Providence, Bahamas; Beaufort, North Carolina; Key West, Pine Key, Florida; Port Tampa, Florida; Panama; Charleston, South Carolina; Antigua, West Indies; Chusan; Macao; Bahia, Brazil; Puntarenas; Madras; Manila; Luzon; Singapore; Massilia; Espiritu-Santo, Balandra Bay, near Point Diablo; Chili; Ile Ronde; Mahé; Tientsin, China; Guadalupe Island; Misaki, Sagami, Japan; Tokyo, Japan; Honolulu, Hawaii. Found on piles at wharf; along the docks. Called "sea monkeys" in Florida. Very numerous among rocks.

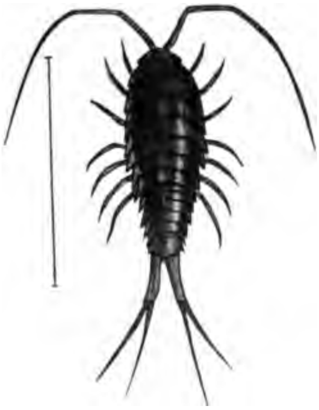


FIG. 716.—LIGYDA EXOTICA (AFTER ROUX).

Body oblong-ovate, a little more than twice as long as wide, 14 mm. : 30 mm. Length of uropoda from tip of terminal segment of body equal to 18 mm. Length of body with uropoda equal to 48 mm. Surface covered with minute granules.

Head twice as wide as long, 3 mm. : 7 mm. Anterior margin regularly rounded. Eyes large, round, composite, and placed at the extreme lateral margins. The first pair of antennæ are inconspicuous and rudimentary; they are composed of two subequal articles and a minute terminal one; they extend to the end of the basal article of the

antennæ. The first and second articles of the second
ıæ are about equal in length; the third article is about
times longer than the second; the fourth is three times
he third; the fifth is one and a half times longer than
The flagellum is composed of fifty-five
en retracted, the second antennæ ex-
ıd, or a little beyond the end, of the
ısal article of the uropoda. The max-
, palp of five articles.

ıts of the thorax are subequal. The
ıroad plates occupying the entire lat-
of the segments, but not distinctly
from the dorsal portion of the seg-
aint line, almost inconspicuous, indi-
e where the coalescence has taken
teral parts of the last three segments
ard.

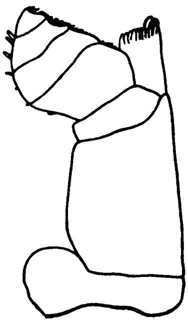
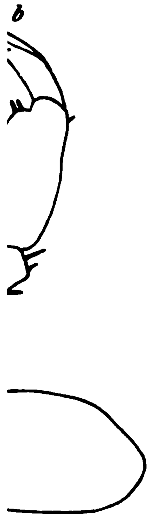


FIG. 717.—LIGYDA EXOTICA. MAXILLIPED. × 15¼.

n is not narrower than the thorax,
ıent being as wide as the seventh thoracic segment. The
f the first two segments are not developed. There is a gradual increase in the length of the segments from the first to the fifth. The lateral parts of the third, fourth, and fifth segments are not distinct from the dorsal portion of the segment. The sixth or terminal segment has the middle part of the posterior extremity produced triangularly in an obtuse point. The post-lateral angles are very acute and long, extending as far as the apex of the middle portion. Between the lateral angles and the middle portion of the segment, but near the lateral angle, are two small triangular processes. The basal article of the uropoda is 6 mm. in length from the apex of the terminal abdominal segment. The branches are of equal length and twice as long as the peduncle, being 12 mm. The inner branch is furnished with a small bristle about half a mm. long.



XOTICA. *a*, TER-
IRST LEG. × 11⅜.
1⅜.

all ambulatory. In the male the first pair has the pro-
ed near its distal end with a small lateral process. This
ting on the first pair of legs in the female.

LIGYDA BAUDINIANA (Milne Edwards).

Ligia baudiniana Milne Edwards, Hist. Nat. Crust., III, 1840, pp. 155–156.
? *Ligia baudiana* Spence Bate, Ann. Mag. Nat. Hist. (4), I, 1868, pp. 443–446.
? *Ligia baudiniana* Saussure, Mém. Soc. Physique et d'Hist. Nat. de Genève, XIV, 1858, pp. 443–446.
Ligia exotica Dollfus, Bull. Soc. d'Etudes Scientifiques de Paris, 12th year, 1890, p. 7.
Ligia exotica hirtitarsis Dollfus, Bull. Soc. d'Etudes Scientifiques de Paris, 12th year, 1890, p. 7.
Ligia baudiana Ives, Proc. Acad. Nat. Sci. Phila., 1891, pp. 185–186, pl. vi, fig. 2.
Ligia hirtitarsis Dahl, Plankton-Expedition, 1892, pp. 111–112, pl. iii.
Ligia baudiniana Richardson, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 574–575.
Ligia gracilis Moore, Report U. S. Commissioner of Fish and Fisheries, XX, Pt. 2, 1902, p. 175, pl. xi, figs. 7–12.
Ligia baudiniana Richardson, Trans. Conn. Acad. Sci., XI, 1902, pp. 306–308, pl. xl, fig. 61.

Localities.—Hamilton Island, Bermudas; Saint Jean d'Ulloa, Mexico; Yucatan; Rio Janeiro; Cuba; Cayenne; Miami, Florida; Jamaica; Culebra, Porto Rico; the Bahamas. Found under algæ and drift along shore (Moore).

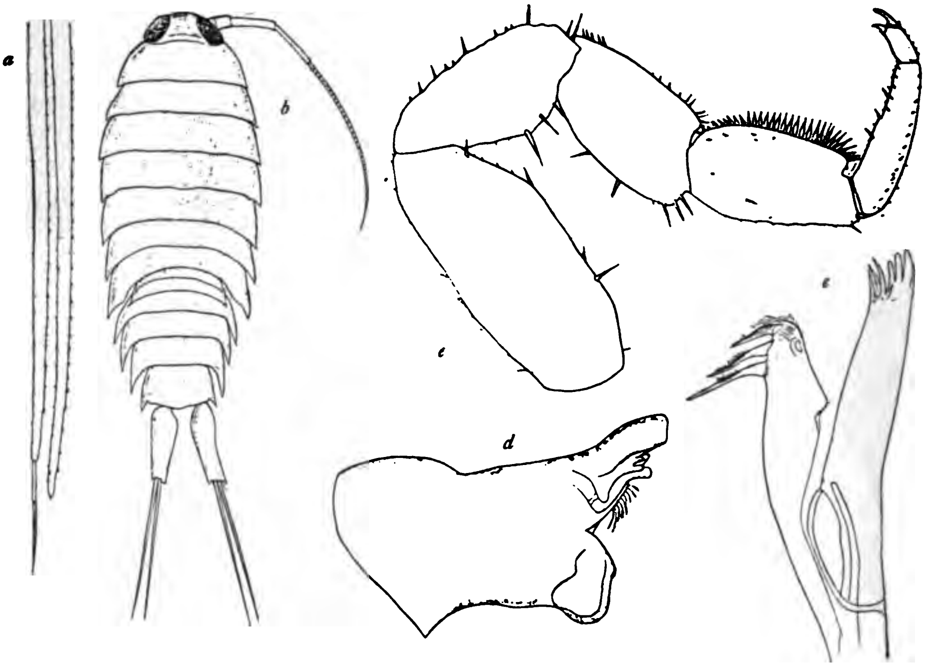


Fig. 719.—Ligyda baudiniana (after Dahl). a, Uropod. b, General figure. c, First leg of male. d, Mandible. e, First maxilla.

Body oblong-ovate, nearly two and a half times longer than wide, 10 mm.:23 mm. Uropoda 10½ mm. long, a little less than half the length of the body. Body, with uropoda, 33½ mm.

The head is twice as wide as long, 2½ mm.:5 mm., with the anterior margin widely rounded. The eyes are narrow elongate, about twice as wide as long, and separated in front by a distance equal to the length of one eye, 2 mm. The first pair of antennæ are small and inconspicuous. The second pair have the first two articles short and subequal; the third article is as long as the first two taken together; the fourth is 3 mm. long, or twice as long as the third; the fifth is 4½ mm. long, or one and a half times longer than the fourth. The flagellum is composed of thirty-eight articles, and extends to the posterior margin of the seventh thoracic segment. The maxilliped has a palp of five articles.

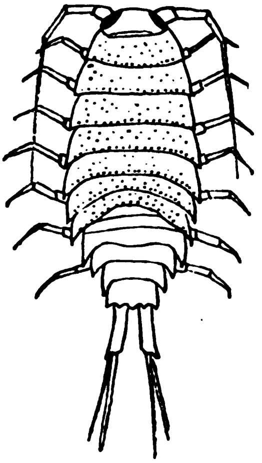


FIG. 720.—LIGYDA BAUDINIANA (AFTER IVES). × 2⅓.

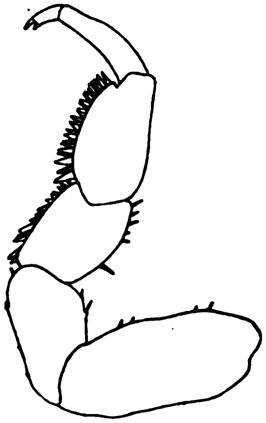


FIG. 721.—LIGYDA BAUDINIANA. FIRST LEG OF MALE. × 11⅔.

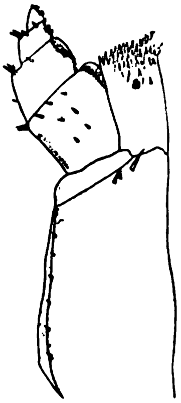


FIG. 722.—LIGYDA BAUDINIANA (AFTER DAHL). MAXILLIPED. × 24⅓

The segments of the thorax are subequal, with lateral margins straight. The epimera are coalesced with the segments, faint depressed lines indicating the place of union.

All six segments of the abdomen are distinct; the first two are somewhat shorter than the three following, and have the lateral parts covered by the seventh thoracic segment. The third, fourth, and fifth segments gradually increase in length, and have the post-lateral angles produced backward in long acute processes. The sixth or terminal segment has the posterior margin triangularly produced in the middle in a very obtuse point, with two small triangular points just within the lateral angles, which are short and not much produced.

The peduncle of the uropoda is 4 mm. long, the branches 6½ mm. long, and of equal length.

The first pair of legs in the male has a fringe or comb of stiff hairs or bristles along the entire length of the carpus and merus.

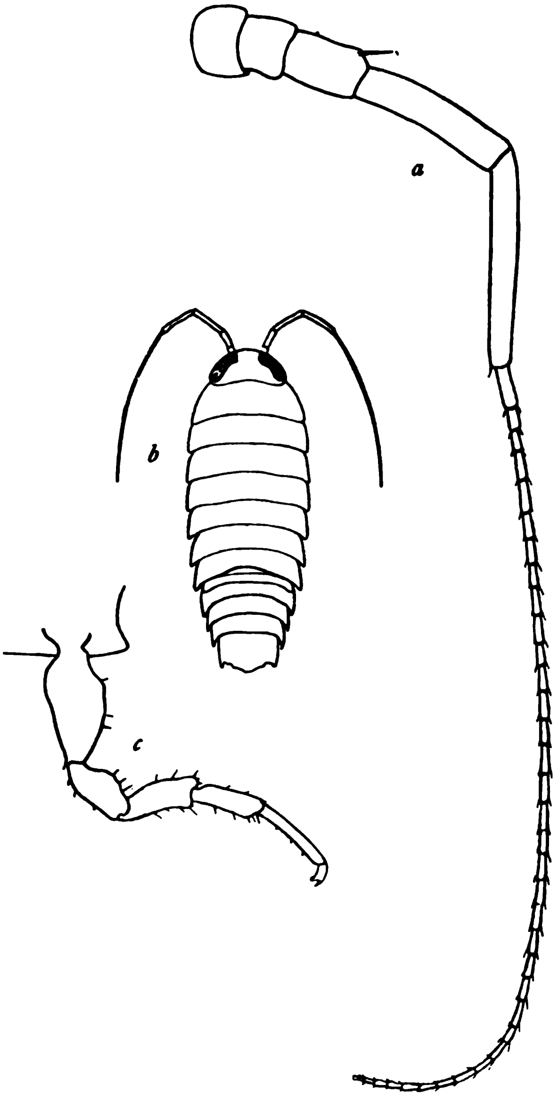


Fig. 723.—Ligyda baudiniana (After Moore). a, Second antenna of female. b, Female. c, First leg of female.

All the legs are ambulatory, with bi-unguiculate dactyli.

The surface of the thorax is covered with small granules.

LIGYDA OCCIDENTALIS (Dana).

Ligia occidentalis DANA, U. S. Expl. Exp., Crust., XIV, 1853, p. 742, pl. XLIX, fig. 7; Proc. Acad. Nat. Sci. Phila., VII, 1854–55, p. 176.—STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 506.—HARFORD, Proc. Cal. Acad. Sci., VII, 1877, p. 116.—BUDDE-LUND, Crust. Isop. Terrestria, 1885, p. 264.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 360.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 866; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 334; American Naturalist, XXXIV, 1900, p. 306; Harriman Alaska Exp., Crust., X, 1904, p. 226; Proc. U. S. Nat. Mus., XXVII, 1904, p. 670.

Localities.—California; San Francisco Bay; San Diego; Santa Cruz Island, California; Sacramento River; Monterey Bay; St. Marguerita Island, Lower California; Sausalito, California; San Bartolomé Bay, Lower California; Farallones, California (J. Lindahl); San José Island, Gulf of California.

Body oblong-ovate, a little more than twice as long as broad, 12 mm. : 26 mm. Uropoda 8 mm. long, or less than one-third the length of the body. Entire length of body with uropoda 34 mm.

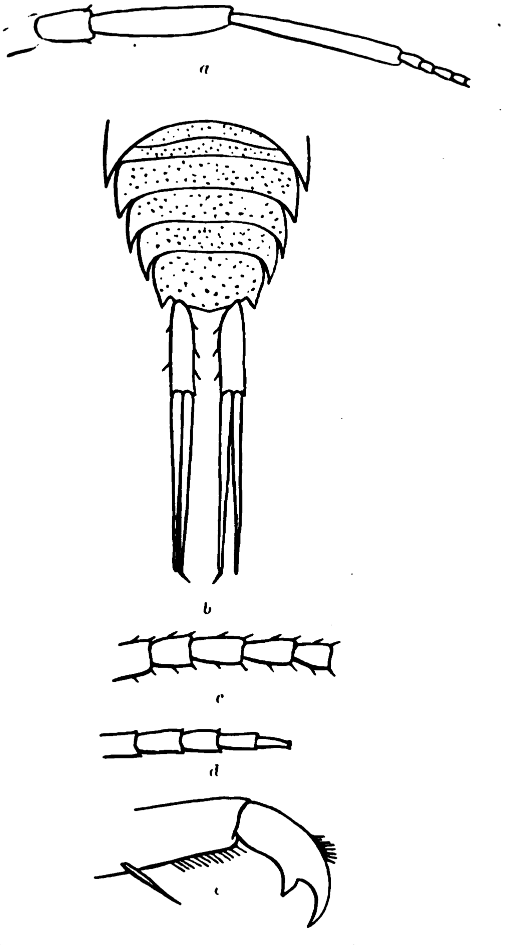


FIG. 724.—LIGYDA OCCIDENTALIS (AFTER DANA). *a*, PEDUNCLE OF SECOND ANTENNA. *b*, ABDOMEN AND UROPODA. *c*, JOINTS OF FLAGELLUM. *d*, TIP OF FLAGELLUM. *e*, FIRST LEG OF MALE.

Head about twice as wide as long, 2½ mm. : 5½ mm., with the anterior margin widely rounded. Eyes large, composite, elongate, and separated in front by a distance equal to the length of one eye, 2 mm. First pair of antennæ minute, inconspicuous. Second pair with the first two articles short and subequal; third article 1½ mm. long or as long as the first two articles together; fourth article 3 mm. long, twice as long as the third article; fifth article 5 mm. in length. The flagellum is composed of twenty-nine articles, and extends to the posterior margin of the sixth thoracic segment. The peduncle of the second antennæ extends to the posterior margin of the second thoracic segment. The palp of the maxillipeds is composed of five articles.

The first four segments of the thorax are subequal and each is about ½ mm. longer than any of the last three, which are subequal. The epimera are perfectly united with the segments, faint lines of depression marking the place of coalescence.

All six segments of the abdomen are distinct, the first two being a little shorter than the three following, and having the lateral parts covered by the seventh thoracic segment. The third, fourth, and fifth segments gradually increase in length, and have the post-lateral angles produced backward in acute processes, which have a faintly marked carina crossing them obliquely. The terminal segment has the posterior margin triangularly produced in an obtuse point. Between this and the lateral angles, which are acute, are two small points. The peduncle of the uropoda is 3 mm. long. The branches are 5 mm. in length and subequal.

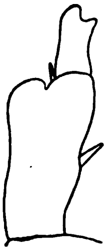


FIG. 725.—LIGYDA OCCIDENTALIS. FIRST LEG (LAST TWO JOINTS). × 20¼.

The legs are all ambulatory, and have the dactylus bi-unguiculate. The first pair in the male have the propodus armed at the distal end on the inner margin with a conspicuous triangular process, similar to that in *L. exotica*.

Entire surface of body covered with small granules.

LIGYDA PALLASII (Brandt.)

Ligia pallasii BRANDT, Bull. Soc. Impér des Natur. de Moscou, VI, 1833, p. 172.
Ligia dilatata STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 507, pl. XXII, fig. 8.
Ligia septentrionalis LOCKINGTON, Proc. Cal. Acad. Sci., VII, 1877, Pt. 1, p. 46.
Ligia stimpsoni MIERS, Proc. Zool. Soc. London, 1877, p. 671 (foot note).
Ligia dilatata SMITH, Report Progress Geol. Survey of Canada, 1880, p. 218.
Ligia pallasii BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 261–262.
Ligia dilatata UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 360.
Ligia pallasii UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 361.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 866; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 334; American Naturalist, XXXIV, 1900, p. 306; Harriman Alaska Exp., Crust., X, 1904, p. 226; Proc. U. S. Nat. Mus., XXVII, 1904, p. 670.

Localities.—Unalaska; Sitka; Wrangel, Alaska; Tanager; Chica Island, Akutan Pass; Lighthouse Rocks, Alaska; Ward Cove, Revillagigedo Island, Alaska; Kyska Harbor; Aleutian Islands; Nazan Bay, Atka; Victoria, Vancouver Island; Puget Sound; Port Townsend, Washington; California; Lowe Inlet, British Columbia; Washington Territory; Lagonistas Creek, California; Farallones, California; Cape Mendocino, California. Found on rock beach, under stones.

Body oblong-ovate, nearly twice as long as broad, 11 mm.:20 mm. Length of uropoda from tip of terminal segment of body, 3 mm. Length of body, including uropoda, 23 mm. Surface covered with minute granules.

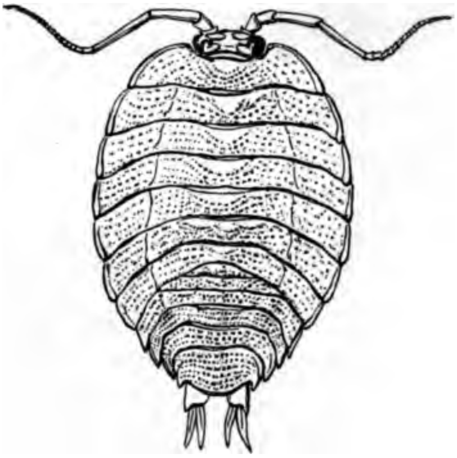


FIG. 726.—LIGYDA PALLASII (AFTER STIMPSON). × 1¼.

Head more than twice as wide as long, 2 mm.:5 mm. Anterior margin widely rounded. Eyes large and round, composite, and situated close to the lateral margins. First pair of antennæ inconspicuous and rudimentary and composed of two short, subequal articles and a minute terminal article. The first antennæ extend only to the end of the first article of the peduncle of the second antennæ. The first two articles of the second pair of antennæ are equal in length; the third is nearly twice as long as the second; the fourth is one and a half times longer than the third; the fifth is one and a half times longer than the fourth. The flagellum is composed of twelve articles. The second pair of antennæ extend to the middle of the fourth thoracic segment when retracted. The maxilliped has a palp of five articles.

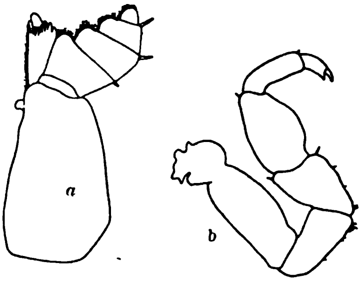


FIG. 727.—LIGYDA PALLASII. a, MAXILLIPED. × 20¼. b, FIRST LEG OF MALE. × 7¼.

The first four segments of the thorax are subequal; the last three are somewhat shorter in the median dorsal line. The lateral portions of the last three segments extend downward. The epimera of all the segments are broad plates, occupying the whole of the lateral margins of the segments and indicated by distinct lines.

The abdomen is as wide as the thorax, the lateral parts of the third segment extending as far as the lateral parts of the seventh thoracic segment. The lateral parts of the first two segments of the abdomen are not developed; those of the last four segments are well developed and have the posterior angles produced downward. The lateral parts are not separated off from the dorsal portion of the segments. On the lateral parts of the third, fourth, and fifth segments are distinct carinæ extending obliquely from the middle of the segment to the posterior extremity. The terminal segment of the body has the middle portion of the posterior extremity regularly rounded, the post-lateral angles not extending quite as far as the middle portion. The basal segment or peduncle of the uropoda is short, being only 1 mm. in length from the tip of the middle part of the abdomen. The branches are equal in length, and are twice as long as the peduncle. The inner branch is furnished with one short bristle about 1 mm. in length.

The legs are all ambulatory.

LIGYDA OCEANICA (Linnæus).

Oniscus oceanicus Linnæus, Syst. Nat., 12th ed., I, Pt..2, 1767, p. 1061.

Cymothoa oceanica Fabricius, Mantissa Insectorum, I, 1787, p. 242.

Ligia oceanica Fabricius, Suppl. Ent. Syst., 1798, p. 301.—Brébisson, Mém. Soc. Linn. Calv., 1825, p. 258.

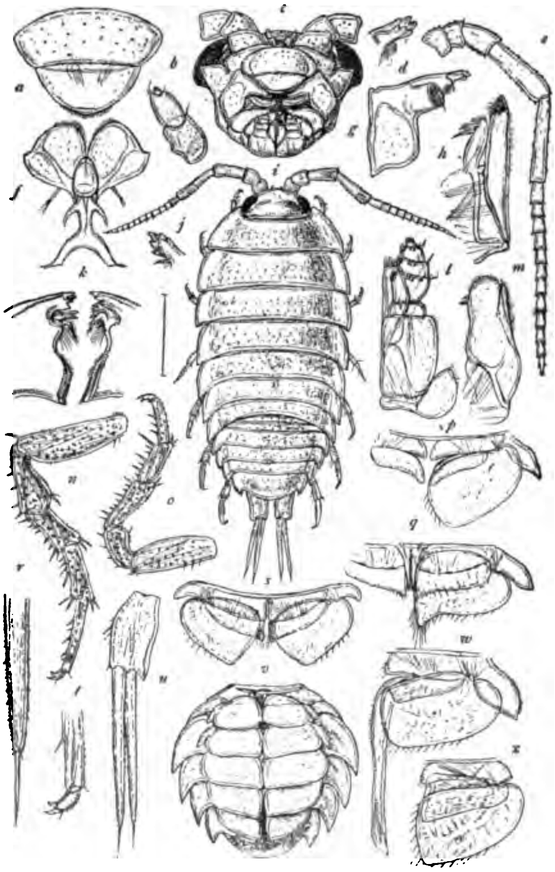


Fig. 728.—Ligyda oceanica (After Sars). *a*, Anterior lip. *b*, First antenna. *c*, Head (ventral view). *d*, Tip of mandible. *e*, Second antenna. *f*, Posterior lip. *g*, Mandible. *h*, First maxilla. *i*, Dorsal view of female. *j*, Tip of mandible. *k*, Mandibles. *l*, Maxilliped. *m*, Second maxilla. *n*, Seventh leg. *o*, First leg. *p*, Second pleopod of female. *q*, First peopod of male. *r*, One branch of uropoda. *s*, First pleopod of female. *t*, Seventh leg (tip). *u*, Uropod. *v*, Abdomen (ventral view). *w*, Second pleopod of male. *x*, Third pleopod of female.

Ligia oniscides Brébisson, Mém. Soc. Linn. Calv., 1825, p. 259.

Ligia oceanica Budde-Lund, Crust. Isop. Terrestria, 1885, pp. 259–261.—Sars, Crust. Norway, II, 1899, pp. 156–157, pl. lxx.—Richardson, American Naturalist, XXXIV, 1900, p. 306; Proc. U. S. Nat. Mus., XXIII, 1901, p. 574.

Localities.—Off Newport, Rhode Island; North Sea; Baltic Sea; Kattegat Sea; Norway; Faroe Islands; coast of Germany; Belgium; Great Britain; France; Spain; Mediterranean Sea; west shore of Helgoland.

Body oblong-ovate, a little over twice as long as wide, 8 mm.: 17 mm. Length of uropoda from tip of terminal segment of body equal to 5 mm. Length of body with uropoda 22 mm. Surface covered with minute granules.

Head twice as wide as long, 2 mm.: 4 mm. Anterior margin widely rounded. Eyes large, round, composite, and situated at the extreme lateral margins. The first pair of antennæ are inconspicuous and rudimentary; they are each composed of two articles and a minute terminal one, and reach to the end of the basal article of the second pair of antennæ. The basal article of the second antennæ is very short; the second and third are subequal and each is twice as long as the first; the fourth is twice as long as the third; the fifth is one and a half times longer than the fourth. The flagellum consists of thirteen articles. When retracted, the second antennæ extend to the posterior margin of the fourth thoracic segment. The maxilliped has a palp of five articles.

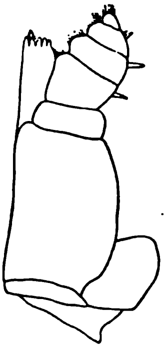


Fig. 729.—Ligyda oceanica. Maxilliped. × 27½.

The first six segments of the thorax are subequal; the seventh is a little shorter. The lateral parts of the last four segments extend somewhat downward. The epimera of all the segments are indicated by distinct lines. They are broad plates and occupy the whole of the lateral margins of the segments.

The abdomen is not narrower than the thorax, the third segment being as wide as the last thoracic segment. The lateral parts of the first two segments are not developed. The lateral parts of the other segments are not separated off from the dorsal portion. The segments increase gradually in length from the first to the fifth. The sixth or terminal segment has the middle part of the posterior extremity regularly rounded. The lateral angles are acute, and do not extend quite to the tip of the terminal segment. The basal segment or peduncle of the uropoda is 1 mm. in length from the extremity or tip of the middle portion of the abdomen. The branches are equal in length, and are four times as long as the basal segment. The inner branch is furnished with a short bristle 1 mm. in length.

The legs are all ambulatory.

124. Genus LIGIDIUM Brandt.[a]

Body oblong; attenuated behind.

First pair of antennæ projecting in front; terminal joint small, articulated at one angle of middle joint. Mandibles without ciliated lappet behind cutting part. Palp of maxillipeds with articles not much expanded; epignath narrow, linguiform.

Abdomen abruptly narrower than thorax; terminal segment with the lateral parts not developed.

Uropoda with the peduncle produced at the inner post-lateral angle in a conical process, to which the inner branch is articulated. Branches unequal in length; inner branch provided with two long and slender terminal bristles.[b]

ANALYTICAL KEY TO THE SPECIES OF THE GENUS LIGIDIUM.

a. Inner branch of the uropoda furnished with two long apical bristles.
  b. Inner branch of the uropoda not extending to the tip of the outer branch. *Ligidium hypnorum* (Cuvier)
  b′. Inner branch of the uropoda longer than the outer branch and surpassing it.
    c. Inner process of the basal article of the uropoda one-fourth as long as the outer branch. Inner branch one-sixth part longer than the outer branch; terminal filaments equal to half the length of the outer branch. *Ligidium tenue* Budde-Lund
    c′. Inner process of the basal article of the uropoda six or seven times shorter than the outer branch. Inner branch one-third part longer than the outer branch. Terminal bristles equal to one-third the outer branch in length. *Ligidium longicaudatum* Stoller
a′. Inner branch of the uropoda not furnished with apical bristles, but tipped with setæ..*Ligidium gracilis* (Dana)

LIGIDIUM HYPNORUM (Cuvier).

Oniscus hypnorum CUVIER, Jour. d'Hist. Nat., II, 1792, p. 19, pl. XXVI.

Ligidium hypnorum BUDDE-LUND, Naturh. Tidsskrift (3), VII, 1870, p. 225.—STUXBERG, Öfversigt Vetensk. Akad. Forhandl., 1875, No. 2, p. 48.—BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 254-256.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 361.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 867; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 335; American Naturalist, XXXIV, 1900, p. 306.

Localities.—California; Niagara in Canada; also Sweden, Denmark, Germany, France, and the British Isles; Constantinople and "Chersoneso Taurico" (Budde-Lund). Found in moist places. Budde-Lund thinks that the species found in North America and recorded by Stuxberg as the above is not likely the same, or rather he doubts that this species occurs in North America. I have never seen any specimens of this species.

[illegible] and figures which Prof. S. J. Holmes gives of *Styloniscus*
[illegible] referred to the genus *Ligidium* Brandt. The

"Body oblong oval; greatest width not attaining half the length. Dorsal face rather convex and perfectly smooth and shining. Cephalon of moderate size and evenly rounded in front. Dorsal face transversely grooved behind the eyes. Lateral parts of the three anterior segments of mesosome but slightly prominent; those of the four posterior segments somewhat larger and terminating behind in obtuse points. Metasome scarcely exceeding in length one-third of the mesosome and much narrower, with the epimeral plates small and appressed; last segment obtusely rounded at the tip, with a slight angle on each side. Eyes very large, oval, extending down the sides of the cephalon. Antennulæ with the first joint rather thick; second longer, but much narrower; both armed at the tip inside with three rather long diverg-

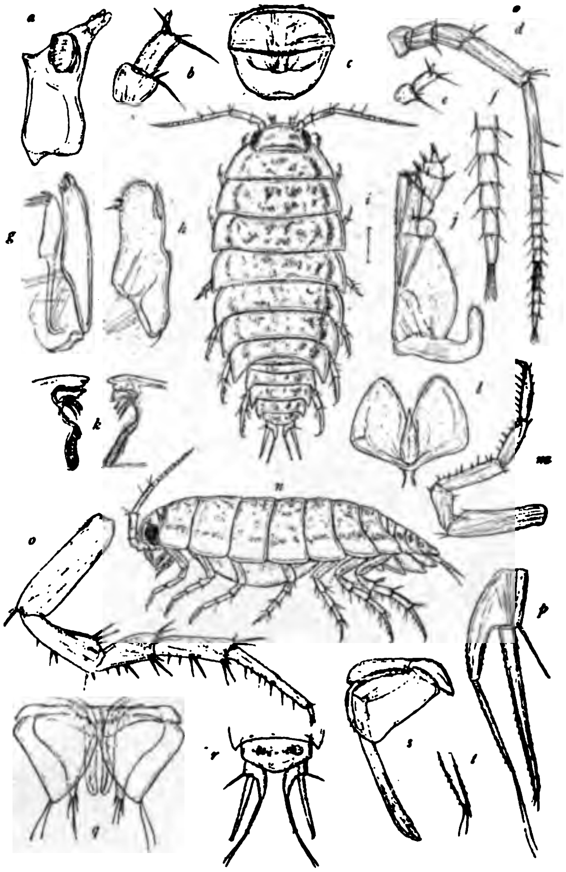


Fig. 730.—Ligidium hypnorum (After Sars). *a*, Mandible. *b*, First antenna. *c*, Anterior lip. *d*, Second antenna. *e*, First antenna. *f*, Flagellum of second antenna. *g*, First maxilla. *h*, Second maxilla. *i*, Dorsal view of female. *j*, Maxilliped. *k*, Mandibles. *l*, Posterior lip. *m*, First leg. *n*, Lateral view of female. *o*, Seventh leg. *p*, Uropod. *q*, First pleopod of female. *r*, Last segment of abdomen and uropoda. *s*, Second pleopod of male. *t*, Extremity of outer branch of uropod.

ing spines; last joint very small, narrow cylindric. Antennæ rather slender, though not nearly attaining half the length of the body. Flagellum somewhat shorter than the peduncle, and composed of about eleven articulations, the last tipped with a dense bunch of delicate hair-like bristles. Legs armed with scattered slender spines; propodal joint very narrow and elongated; dactylus simple. Inner plate of first pair of pleopoda in male slightly produced at the tip and provided with four apical bristles. Uropoda scarcely exceeding half the length of the metasome; inner projection of the basal part occupying about half its length; outer ramus gradually tapering distally and carrying on the tip three short bristles; inner ramus very narrow, linear, not extending to the tip of the outer; apical bristles nearly as long as the ramus. Color of dorsal face light fuscous, variegated with irregular dark patches, which, on each side at the base of the lateral plates of mesosome, form a nearly continuous longitudinal band. Length of adult female, 9 mm."—G. O. SARS.[a]

LIGIDIUM TENUE Budde-Lund.

Ligidium tenue BUDDE-LUND, Crust. Isop. Terrestria, 1885, p. 258.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 867; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 335; American Naturalist, XXXIV, 1900, p. 306.

Locality.—Sitka Island.

Body elongate, narrow, posteriorly attenuated, somewhat convex, smooth.

Second pair of antennæ lost in the specimen.

Transverse line of the epistome raised, straight, or very slightly sinuated in the middle.

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[a] Crust. of Norway, II, 1899, p. 158. The description which follows is that of G. Budde-Lund:

Oblonge ovatum, post attenuatum, leviter convexum, læve, nitidum.

Antennæ exteriores graciles, dimidium corpus longitudine æquantes; flagellum 10–13 articulatum.

Oculi sat magni.

Caput ante rotundatum, linea frontalis marginalis nulla; epistoma linea transversa elevata, medio acute sinuata; vertex sulco postico supramarginali duobusque sulcis post oculos arcuatis præditus.

Trunci annuli duo priores margine posteriore curvato, duo sequentes subtransversi, tres posteriores post magis medio sinuati. Epimera parva, angulis posticis annulorum duorum priorum rotundate obtusis, annulorum duorum sequentium subrectis, trium posteriorum acutis.

Pedes graciles; unguiculi appendice gemina, flabellata.

Cauda trunco abrupte angustior. Annulus analis late rotundate triangulus. Processus internus articuli basalis pedum analium ramo terminali exteriore triplo brevior. Ramus terminalis interior gracilis, apicem rami exterioris subattingens, filis duobus terminalibus tenerrimis, ramum exteriorem longitudine æquantibus.

Color e fusco brunneus, albido vel flavo marmoratus, in lateribus pallidioribus serie longitudinali macularum nigrofuscarum; vivus pruinosus.

Longitudo 7–10 mm., latitudo 3–4 mm., altitudo, 1.6–1.8 mm.—BUDDE-LUND, Crust. Isop. Terrestria, 1885, pp. 254–256.

ner process of the basal article of the uropoda one-fourth as long ıe outer branch. Inner branch long, extending much beyond the : of the outer branch, being a sixth part longer than that branch, two terminal filaments short, equal to half the length of the outer ıch.

ɔlor dark, without spots. Length 9 mm. Width 3 mm.[a]

LIGIDIUM LONGICAUDATUM Stoller.

Ligidium longicaudatum STOLLER, 54th report New York State Museum, 1902, pp. 208–211.

ocality.—Schenectady, New York.

ody oblong-ovate, about twice as long as wide, 3 mm.: 6 mm. poda, 2 mm. Length of body with uropoda, 8 mm. long.

ead twice as wide as long, 1 mm.: 2 mm., with the anterior mar- widely rounded. Eyes round, com- te, and situated close to the lateral gins. The first pair of antennæ are ll and almost inconspicuous. They composed of three articles—two equal ones and a minute terminal They extend to the end of the sec- article of the peduncle of the sec- pair of antennæ. The second pair ıntennæ have the first two articles ·t and subequal; the third is but e longer than the second; the fourth fifth are equal in length and each is ıt twice as long as the third. The ɜllum is composed of eleven articles, terminal article ending in a bunch ıairs. When retracted, the second ınnæ extend to the posterior mar- of the third thoracic segment.

he first four segments of the thorax subequal and each is a little longer ı any of the last three, which are sub- ıl. The epimera are not distinctly separated on any of the segments.

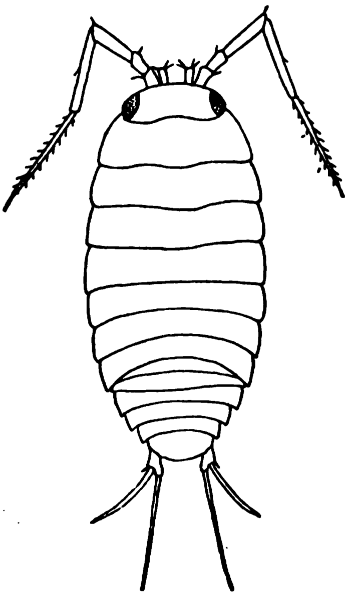

FIG. 731.—LIGIDIUM LONGICAUDATUM (AFTER STOLLER). × 5¼.

he first segment of the abdomen has the lateral parts concealed by

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'he above description is adapted from the following one of Budde-Lund's:

ongatum, angustum, post attenuatum, leviter convexum, læve, nitidum.

ıtennæ exteriores ———.

ɔistomatis linea transversa, elevata, subrecta vel medio levissime sinuata.

ocessus internus articuli basalis pedum analium ramo terminali exteriore quad- ɔ brevior. Ramus terminalis interior longus, apicem rami exterioris multum rans, illo sexta parte longior, filis duobus terminalibus brevibus, dimidiam ·m rami exterioris æquantibus.

ɔlor fuscus, immaculatus. Longitudo 9 mm., latitudo 3 mm.—BUDDE-LUND, t. Isop. Terrestria, 1885, p. 258.

the seventh thoracic segment. The four following segments have the lateral parts well developed. The sixth or terminal segment is rounded posteriorly, with a slight emargination on either side of the rounded median lobe for the reception of the basal articles of the uropoda. The basal article of the uropoda has the inner distal angle produced so that the inner side measures one and a half times longer than the outer side. The inner branch of the uropoda is two and a half times longer than the peduncle measured from the inner side; it terminates in two long subequal hairs, which are a little less than one-fourth the length of the inner branch. The outer branch is shorter than the inner branch, the inner branch being a little less than one and a half times longer than the outer branch. The outer branch is also tipped with two short hairs.

All the legs are ambulatory.

In color it is a reddish brown, mottled with yellow, and with two longitudinal rows of yellow spots, one on either side of the body about the place where the epimera are united with the segments.

LIGIDIUM GRACILIS (Dana).

Styloniscus gracilis DANA, Proc. Acad. Nat. Sci. Phila., VII, 1854–55, p. 176.—STIMPSON, Bost. Jour. Nat. Hist., VI, 1857, p. 506.

Alloniscus maculosus HARFORD, Proc. Cal. Acad. Sci., VII, 1877, p. 54.

Styloniscus gracilis BUDDE-LUND, Crust. Isop. Terrestria, 1885, p. 271.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 364.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 867; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 335; American Naturalist, XXXIV, 1900, p. 306.—HOLMES, Proc. Cal. Acad. Sci. (3), III, 1904, pp. 318–319.

Locality.—California.

"Thoracic segments smooth, glossy, and of subequal length; postero-lateral and antero-lateral angles of the first four rounded, the postero-lateral angles of the last three segments acute and produced backward.

"Abdomen longer than wide, abruptly narrower than the thorax, the first two segments shorter than the others, the three following segments with the postero-lateral angles acute and produced backward. Terminal segment twice as wide as long and very broadly rounded.

"Head transverse, devoid of prominences, front broadly rounded. Eyes rather large, reaching the lateral margins of the head. Antennules three-jointed, not exceeding the second basal joint of the antennæ; first joint broad, distally widened; second joint subcylindrical, slightly longer and much narrower than the first; third joint very minute and joined to one corner of the preceding. Antennæ nearly one-half the length of the body, first joint short, transverse, second and third joints oblong, cylindrical, subequal, fourth joint as long as the three preceding, fifth joint narrower and slightly longer than the fourth; flagellum about as long as the two preceding joints and composed of thirteen to fifteen articulations.

"Mandibles short and very stout, having a large molar tubercle and a narrow dark-colored, dentate cutting edge, but no palp. First maxillæ with the inner plate short and furnished with three short ciliated setæ, the upper one much shorter than the lower two, which are of subequal length; outer plate narrow and armed with five curved teeth. Second maxillæ narrow, with two very small ciliated plates on the inner margin near the rounded tip. Inner plate of the maxillipeds with several short, densely ciliated processes on the transverse distal margin and a large ciliated seta on the inner side; palp five-jointed, the terminal joint minute.

"Legs very spiny below; dactyls short, furnished with several setæ and one or two spines below, near the tip. Uropods slender, fully one-half the length of the abdomen; peduncle oblong, flattened, the inner angle strongly produced backward; rami slender, microscopically scabrous but devoid of spines; inner ramus exceeding the outer in length, but slightly more slender, the tip furnished with setæ.

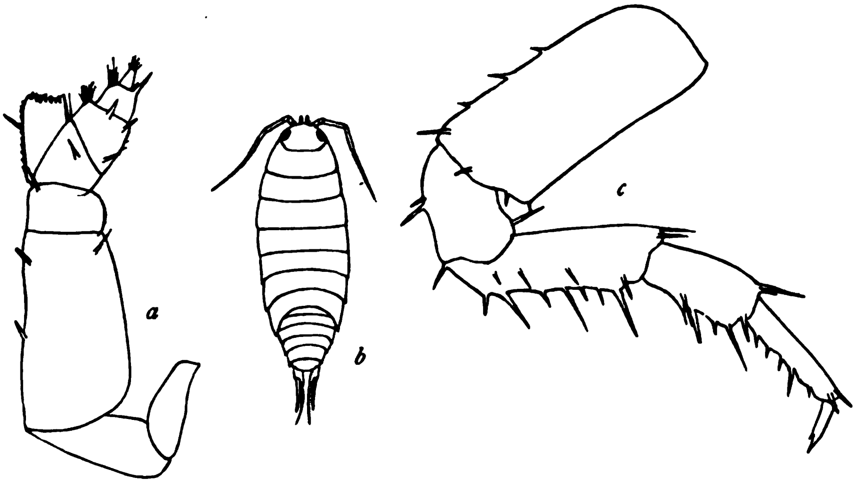

FIG. 732.—LIGIDIUM GRACILIS (AFTER HOLMES). *a*, MAXILLIPED. *b*, GENERAL FIGURE. *c*, FIRST LEG.

"The body is furnished with scattered fine short hairs, which are more conspicuous on the posterior margins of the segments.

"Length $\frac{1}{20}$ inch."—HOLMES.[a]

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[a] The above description is quoted from Proc. Cal. Acad. Sci., (3), III, 1904, p. 318, and is made originally from the three type specimens of *Alloniscus maculosus* Harford, which Mr. Holmes identifies with *Styloniscus gracilis* Dana, the description of which follows:

Corpus gracile. Abdomen paulo oblongum, subovatum, thorace postico subito paululo angustius, segmentis 3 tio, 4 to, 5 toque lunatis. Styli caudalis basis brevis, vix duplo longior quam latus, extus ad medium subito angustior. Antennæ externæ fere nudæ, flagello fermè 14 articulato, nudo, articulos basis duos precedentes longitudine fere æquante.—Long. 5 mm.

As in other species of this genus, the outer antennæ have not the double geniculation characterizing the Oniscidæ. The surface of the body is smooth; yet th are a few exceedingly minute hairs, especially along the posterior margin of th ments of the abdomen. The branches of the caudal stylets in the speci mutilated.—DANA, Proc. Acad. Nat. Sci. Phila., VII, 1854–55, p. 176.

125. Genus EUPHILOSCIA Packard.

"The genus *Euphiloscia* differs from *Philoscia* in the flagellum of the outer antennæ being subdivided into fifteen joints, while it is no longer than in the latter genus. The second and third joints are rather short; the inner (and smaller) antennæ are very much larger. The body is longer and slenderer, and the abdomen much longer and wider in proportion to the rest of the body, being large and rounded, not mucronate. Uropoda much longer and slenderer than in *Philoscia*, being as long as the basal abdominal segment is wide; they are subequal. Eyes larger than in *Philoscia*. In the form of the legs and the setæ this genus more closely resembles *Philoscia* than *Philougria*, and is some respects intermediate between the two genera."—PACKARD.[a]

EUPHILOSCIA ELRODII Packard.

Euphiloscia elrodii PACKARD, 5th Report Peabody Acad. Sci., 1873, p. 97.—SMITH, Amer. Jour. Science and Arts (3), IX, 1875, p. 477.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 361.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 306.

Locality.—Indiana.

"Having no other species with which to compare my two specimens of this species, I can only remark that it is of the usual color of the species of *Philoscia* found running about in moss, and the cave specimens had not been altered by their subterranean life. The eyes are dark as usual, while the body is mottled with brown and carneous, with no well-marked dorsal streak."—PACKARD.[b]

Family XXIX. TRICHONISCIDÆ.[c]

Body elongated.

Head with distinct lateral lobes; front scarcely marginate, more or less produced, not separated from the epistome. Eyes composite, simple or wanting. Inner lobe of the first maxillæ furnished with three plumose processes. Palp of the maxillipeds large, imperfectly articulated; masticatory lobe terminating in a thin lash, epignath narrow. Mandibles with the molar expansion well developed. First pair of antennæ very small, inconspicuous; terminal joint furnished with olfactory hairs. Flagellum of the second pair of antennæ composed of a limited number of articles.

Lateral parts of the thoracic segments not much expanded.

Opercular plate of pleopoda not furnished with tracheæ.

Uropoda with the basal article expanded inside; branches subequal, slender, or the outer one stouter, both conically tapered.

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[a] Fifth Report Peabody Academy of Sciences, 1873, pp. 96-97.

[b] Idem, p. 97.

[c] For characters of family see Budde-Lund, Crust. Isopoda Terrestria, 1885, p. 243, and G. O. Sars, Crust. of Norway, II, 1899, pp. 159-160.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY TRICHONISCIDÆ.

a. Eyes present.

  b. Body not sculptured dorsally with longitudinal ribs. Lateral parts of the thoracic segments not expanded. Second pair of antennæ long. Branches of the uropoda terminating in a bunch of hairs. Epignath of maxillipeds narrow, linguiform with a rounded expansion at the base. Abdomen abruptly narrower than thorax ....Genus *Trichoniscus* Brandt

  b′. Body sculptured dorsally with longitudinal ribs. Lateral parts of thoracic segments expanded. Second pair of antennæ short. Inner branch of the uropoda terminating in a slender spine. Epignath of maxillipeds simple, lanceolate. Abdomen not abruptly narrower than thorax..Genus *Haplophthalmus* Schöbl

a′. Eyes absent ....Genus *Brackenridgia* Ulrich

126. Genus TRICHONISCUS Brandt.[a]

Body oblong.

Head usually rounded in front, generally with small but distinct lateral lobes.

Eyes small, distinct, composed of three ocelli. Second pair of antennæ generally long.

Palp of maxillipeds with the four joints confluent; masticatory lobe nearly as large as the palp and terminating in a narrow, ciliated lash; epignath narrow, linguiform, with a rounded expansion at the base.

Abdomen abruptly narrower than thorax; lateral parts of all the segments visible, small.

Terminal abdominal segment usually truncate at tip, and slightly emarginate on each side.

Legs long, slightly increasing in length posteriorly; joints furnished with spines.

Inner branch of the first pair of pleopods greatly produced and bi-articulate in the male.

Basal article of uropoda broad and flattened, both branches terminating in a bunch of hairs.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS TRICHONISCUS.

a. Surface of body smooth. Front of head straight with small lateral lobes. Last three articles of second pair of antennæ with the inner margins not beset with tubercular-like papillæ. Terminal segment of abdomen with apex truncate. *Trichoniscus pusillus* Brandt

a′. Surface of body covered with low tubercles. Front of head triangularly produced, with apex slightly emarginate; antero-lateral lobes large. Last three articles of second pair of antennæ with the inner margins beset with tubercular-like papillæ, each surmounted with a tuft of short stiff hairs. Terminal segment of abdomen with apex rounded..... *Trichoniscus papillicornis* Richardson

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[a] See Budde-Lund for characters of genus, Crust. Isop. Terrestria, 1885, p. 243, and Sars, Crust. of Norway, II, 1899, pp. 160–161.

TRICHONISCUS PUSILLUS Brandt.

Trichoniscus pusillus Brandt, Bull. Soc. Impér. des Naturalistes de Moscou, VI, 1833, p. 12, pl. IV, fig. 9.

Itea riparia Koch, Deutschl. Crust., 1835–44, p. 22.

Itea lævis Zaddach, Synops. Crust. Pruss., 1844, p. 16.

Philougria riparia Kinahan, Nat. Hist. Rev., IV, 1857, p. 281, pl. XXII, figs. 1–4.

Trichoniscus pusillus Stuxberg, Öfversigt-Vetensk-Akad. Forhandl., 1875, No. 2, p. 49.—Budde-Lund, Crust. Isop. Terrestria, 1885, p. 244–245.—Underwood, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 364.—Sars, Crust. Norway, II, 1899, p. 161.—Richardson, American Naturalist, XXXIV, 1900, p. 307; Proc. U. S. Nat. Mus., XXIII, 1901, p. 575.

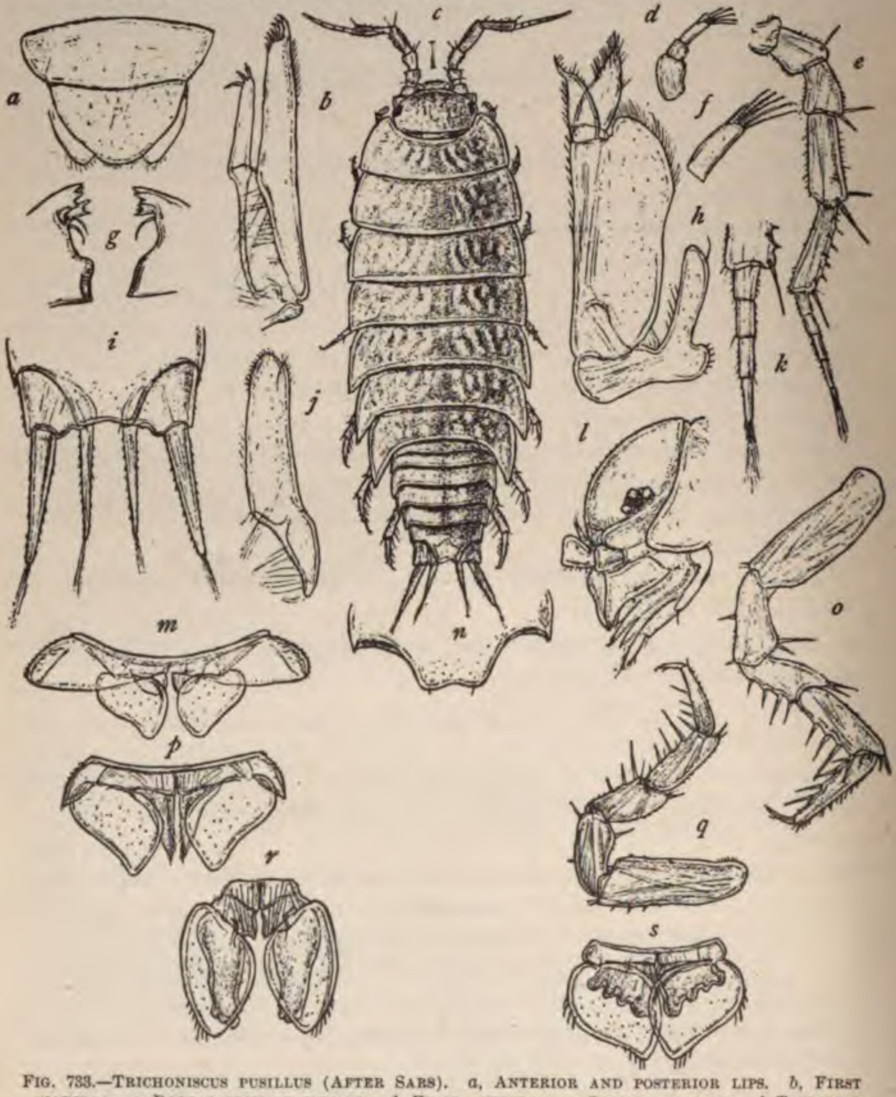

Fig. 733.—Trichoniscus pusillus (after Sars). *a*, Anterior and posterior lips. *b*, First maxilla. *c*, Dorsal view of female. *d*, First antenna. *e*, Second antenna. *f*, Terminal joint of first antenna. *g*, Mandibles. *h*, Maxilliped. *i*, Last segment of abdomen and uropoda. *j*, Second maxilla. *k*, Flagellum of second antenna. *l*, Head (lateral view). *m*, First pleopod. *n*, Outline of terminal segment. *o*, Seventh leg. *p*, Second pleopod. *q*, First leg. *r*, Third pleopod. *s*, Fifth pleopod.

Localities.—North America; also Sweden, Denmark, Germany, France, Great Britain, Spain, Algeria, and Norway.

Body oblong-ovate, three times as long as wide, 1 mm.: 3 mm.

Head wider than long, with the anterior margin produced in a widely rounded, obtuse median lobe. There are no antero-lateral lobes. The eyes are small, round, composite, and situated in the antero-lateral angles of the head. The first pair of antennæ are rudimentary and inconspicuous. The first three articles of the second antennæ are short, the first two being subequal, the third, one and a half times longer than either of the others; the fourth and fifth are subequal and each is one and a half times longer than the third. The flagellum is composed of four or five ill-defined articles. The maxilliped has a palp of two articles. The palp of the mandibles is wanting.

The segments of the thorax are subequal. The epimera are not separated off on any of the segments.

The abdomen is abruptly narrower than the thorax. The first two segments have the lateral parts covered by the seventh thoracic segment. The sixth, or terminal, segment is wide posteriorly, with the post-lateral angles rounded and a slight emargination in the middle of the posterior margin. The basal article of the uropoda or the peduncle extends as far as the posterior margin of the terminal segment. The inner branch is more slender and is a little shorter than the outer branch. Both branches extend some distance beyond the abdomen. All the legs are ambulatory..

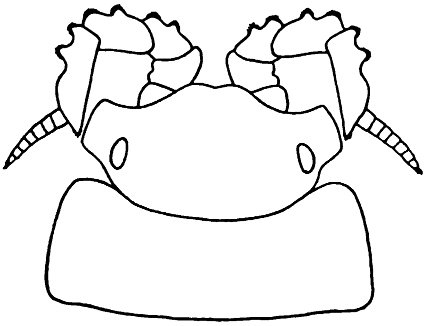

FIG. 734.—TRICHONISCUS PAPILLICORNIS. HEAD AND FIRST THORACIC SEGMENT. × 41.

TRICHONISCUS PAPILLICORNIS Richardson.

Trichoniscus papillicornis RICHARDSON, Harriman Alaska Exp. Crust., X, pp. 213–230; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 670–671.

Locality.—Seldovia, Cook Inlet, Alaska.

Body covered with low tubercles. Color light brown.

Head with sides produced at the antero-lateral angles in large lobes; front triangularly produced with a slight emargination at the apex of the triangle. Eyes situated on the lateral margins at the base of the antero-lateral lobes; they are small and black and apparently simple in structure. The peduncle of the antennæ consists of five stout joints, the last three of which have the inner margins beset with numerous strong tubercular-like papillæ, each surmounted with a tuft of sho stiff hairs or bristles; the fifth joint is also produced at the outer distal angle in an acute process. The flagellum is composed of about seven articles, rather indistinctly defined; the last article is tipped with a bunch of hairs. The buccal mass is very prominent below.

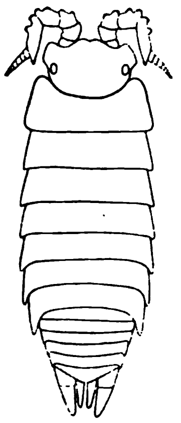

FIG. 735.—TRICHONISCUS PAPILLICORNIS. × 15.

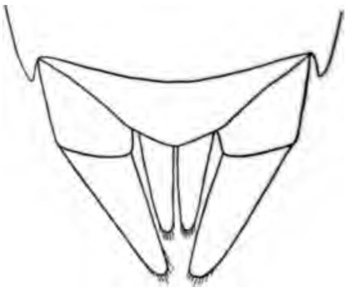

FIG. 736.—TRICHONISCUS PAPILLICORNIS. UROPODA AND LAST SEGMENT OF ABDOMEN. × 77.

The segments of the thorax are about equal in length. The postlateral angles of all the segments, except the first, are produced backward, very slightly in the case of the second, third, and fourth, but becoming gradually more so, until the last two segments show this character very markedly.

The abdomen is narrower than the thorax. All the segments are visible in entirety, not being covered laterally by the last thoracic segment. The terminal segment is triangularly produced, with the apex somewhat rounded. The uropoda are short, styliform; the outer branch is the stouter, and extends a little beyond the extremity of the inner branch. Both branches are tipped with a few hairs.

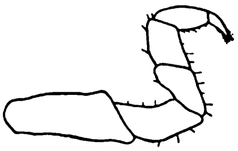

FIG. 737.—TRICHONISCUS PAPILLICORNIS. LEG OF FIRST PAIR. × 15.

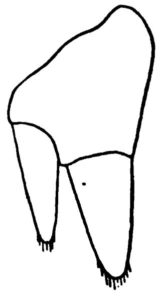

FIG. 738.—TRICHONISCUS PAPILLICORNIS. UROPOD OF LEFT SIDE. × 77.

Only a single specimen was obtained by the Harriman Alaska Expedition. It was found on the beach at Seldovia, Cook Inlet.

The type is in the U.S.N.M., Cat. No. 28772.

127. Genus HAPLOPHTHALMUS Schöbl.[a]

Body oblong, somewhat convex, sculptured dorsally with longitudinal ribs.

Head triangularly produced in the middle; lateral lobes large; front scarcely defined from the epistome. Eyes small, simple, dorsally situated. Second pair of antennæ short, nearly equal to one-third the length of the body. Palp of maxillipeds obscurely composed of five articles; epignath simple, lanceolate.

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 166–167, and Budde-Lund, Crust. Isop. Terrestria, 1885, p. 249.

Abdomen not abruptly narrower than the thorax; epimera large, distant; terminal segment truncate.

Lateral parts of the thoracic segments expanded, discontinuous.

Inner branch of the first pair of pleopods in the male, produced, biarticulate, that of the second pair in the male triarticulate. Inner branch of the uropoda terminating in a single, slender spine; basal article broadly expanded inside.

Legs rather short and thick, scarcely increasing in length posteriorly.

HAPLOPHTHALMUS PUTEUS Hay.

Haplophthalmus puteus Hay, Proc. U. S. Nat. Mus., XXI, 1899, pp. 871–872, pl. LXXXVI, figs. 1–15.

Localities.—Wells in Indiana.

"*Male.*—Body elliptical, length about three times the breadth, dorsal surface strongly convex, covered with longitudinal rows of low tubercles and scattered setæ. Segments of the peræon about equal in length, the posterior pleural angle of all, except the first, more or less produced backward. Pleuræ of third, fourth, and fifth segments of the pleon thin and directed backward and outward. Terminal segment of abdomen notched behind and with the postero-lateral margins concave. Uropods exserted, short, outer ramus longer than inner; both rami setose. Front margin of head very slightly produced. Antennæ longer than the greatest breadth of the body; first and second segments of medium length, third short, fourth and fifth long; flagellum short, pinniform, composed of three very small, closely articulated segments. Antennæ geniculate between segments four and five. Antennules minute, composed of three segments entirely concealed by the front of the head, sensory filaments five. Eyes small, simple. Upper lip regularly rounded in front and with a median triangular patch of setæ. Mandibles large and powerful, bearing on the inner surface a broad, ridged molar tubercle; on the anterior surface, one or two delicate, branched sensory styles. The cutting portion of the mandibles is different; that on the left consists of two portions, an outer with four heavy teeth and an inner with three much smaller teeth; the outer mandible has but one row of three or four large teeth which, when closed, fit in the space between the two rows of teeth of the mandible first described. The first maxilla has both branches erect, the outer bearing five or six acute curved teeth, the inner three delicate plumose flagelliform processes. The second maxilla consists of two strap-shaped lamellæ closely applied to one another and bearing setæ at their ends. The maxilliped is a broad, low, flattened plate, with straight inner and rounded outer margins, and bearing at the tip two obscurely segmented setose processes. The peræopods are similar in general to one another, differing only in the arrangement and strength of the spines.

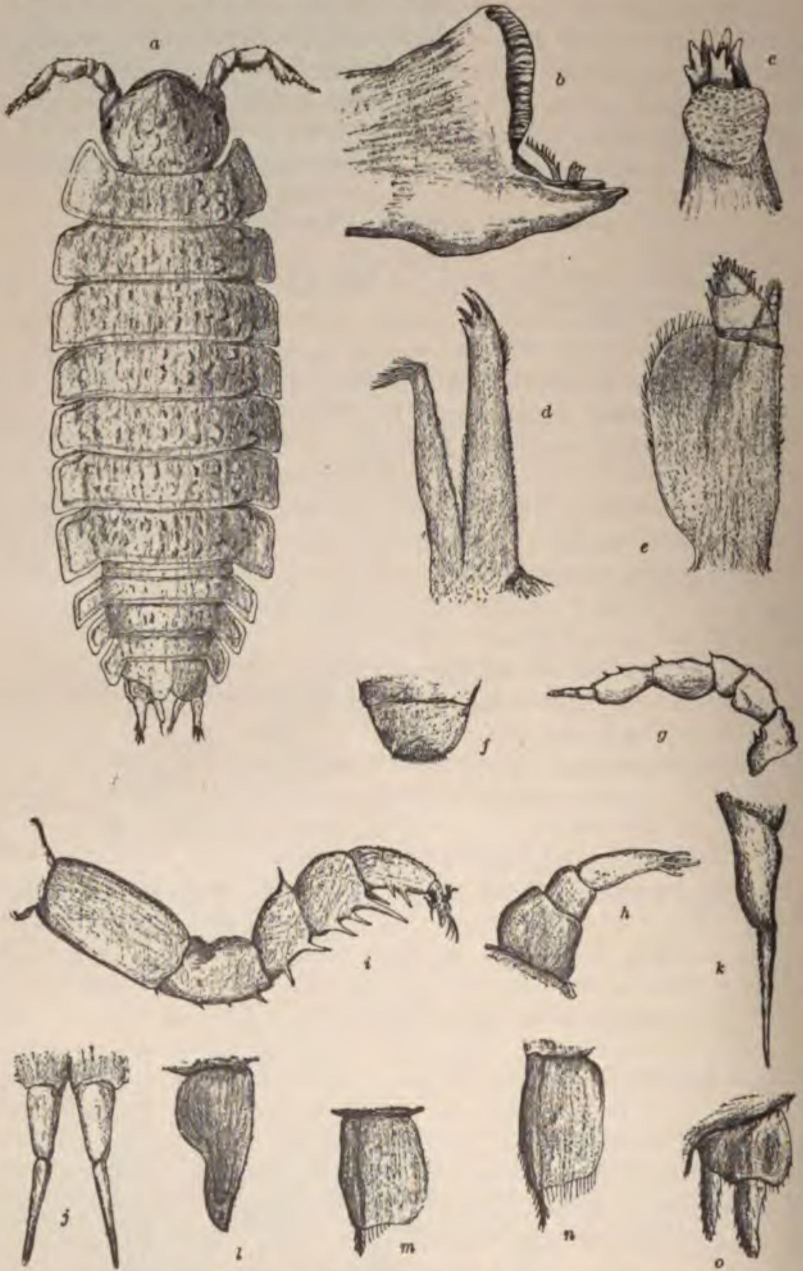

FIG. 739.—HAPLOPHTHALMUS PUTEUS (AFTER HAY). *a*, DORSAL VIEW OF MALE. *b*, RIGHT MANDIBLE. *c*, TIP OF LEFT MANDIBLE. *d*, FIRST MAXILLA. *e*, MAXILLIPED. *f*, UPPER LIP. *g*, SECOND ANTENNA. *h*, FIRST ANTENNA. *i*, FIRST LEG. *j*, FIRST PLEOPOD. *k*, SECOND PLEOPOD. *l*, THIRD PLEOPOD. *m*, *FOURTH PLEOPOD*. *n*, FIFTH PLEOPOD. *o*, UROPOD.

"The first and second pairs of pleopoda are two segmented, slender, and styliform. The second pair appear to be the sexual organs, while the first are to some degree rudimentary.

"The third pleopod is flattened and somewhat operculiform.

"The fourth and fifth pleopods are broad, flat, thin, and lie flat upon one another and the last segment of the pleon. They and the preceding are the branchial appendages of the animal.

"The uropoda have been already described.

"Color white; eyes black; intestine showing through the shell as a grayish line.

"Female: Similar in general characters to the male, but with the following differences: Body not more than two and one half times as long as wide. First and second pleopods absent. Peræopods, with flattened plates, forming a brood or egg chamber.

"Length, 3 to 4 mm.

"*Type.*—No. 22586, U.S.N.M."—W. P. Hay.[a]

128. Genus BRACKENRIDGIA Ulrich.

Eyes absent.

Median and antero-lateral lobes of head almost obsolete. Flagellum of second antennæ composed of seven articles. Abdomen abruptly narrower than thorax; sixth or terminal segment posteriorly rounded. Body without longitudinal ribs.

Right mandible with two appendages back of cutting surface; another fringed appendage on the hind cutting surface. Left mandible with two fringed appendages next to cutting surface. Maxilliped with a palp composed of three articles and with two small projections on the anterior margin. Outer branch of uropods longer than abdomen, conical. Inner branch much smaller, spiny.

BRACKENRIDGIA CAVERNARUM Ulrich.

Brackenridgia cavernarum Ulrich, Trans. Amer. Microscopical Soc., XXIII, 1902, pp. 90-93, pl. xvi, figs. 1-9.

Localities.—Ezell's Cave and Beaver Cave, near San Marcos, Texas.

Body oblong-ovate, about three times longer than wide, 1½ mm.: 4½ mm.

Head wider than long, with the frontal margin almost straight, the median and lateral lobes being almost obsolete. Eyes absent. The first pair of antennæ are rudimentary and inconspicuous. The second pair have the first and second articles subequal in length; the third article is a little longer than the second; the fourth is one and a half times as long as the third; the fifth is a little longer than the fourth. The flagellum is composed of seven articles.

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[a] Proc. U. S. Nat. Museum, XXI, 1899, pp. 871-872. Although the types (two or three fragments) are in the U. S. National Museum, they have been so mutilated, through dissection, that I have found it more satisfactory to quote the above.

The segments of the thorax are subequal in length. The lateral margins are straight. The epimera are not distinctly separated from the segments.

The abdomen is abruptly narrower than the thorax. The first two segments have the lateral parts covered by the seventh thoracic segment. The sixth or terminal segment has the posterior margin rounded. The basal article of the uropoda does not extend beyond the extremity of the last abdominal segment. The inner branch is about half as long as the outer branch.

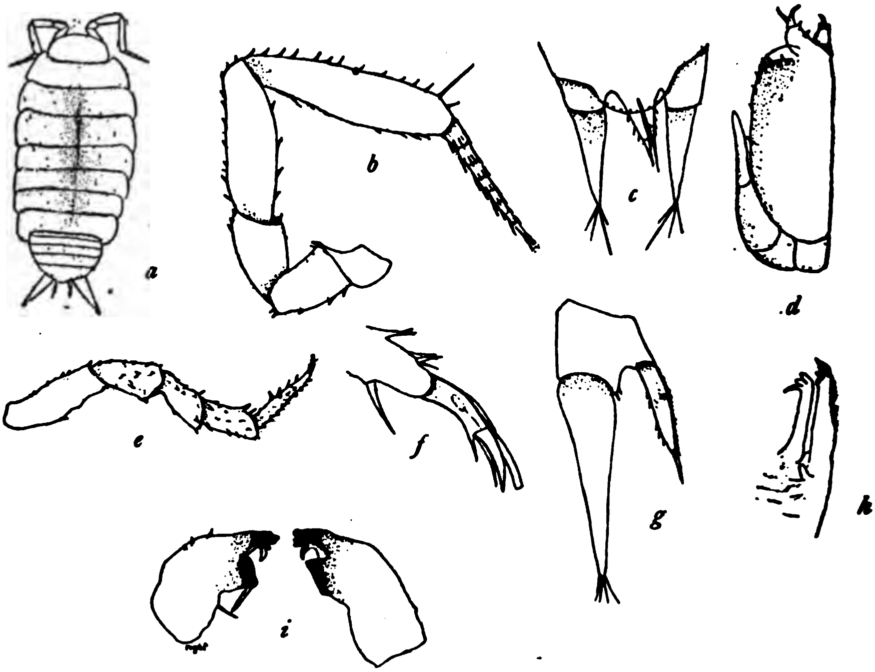

FIG. 740.—BRACKENRIDGIA CAVERNARUM (AFTER ULRICH). *a*, DORSAL VIEW. *b*, SECOND ANTENNA. *c*, LAST ABDOMINAL SEGMENT WITH UROPODS. *d*, MAXILLIPED. *e*, THORACIC LEG. *f*, CLAW. *g*, ONE OF UROPODA. *h*, FIRST MAXILLA. *i*, MANDIBLES.

The legs are all ambulatory in character. The seventh pair has the outer distal extremity of the propodus surmounted with a crest of hairs.

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